December, 1945 Vol. 34, No. 10

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

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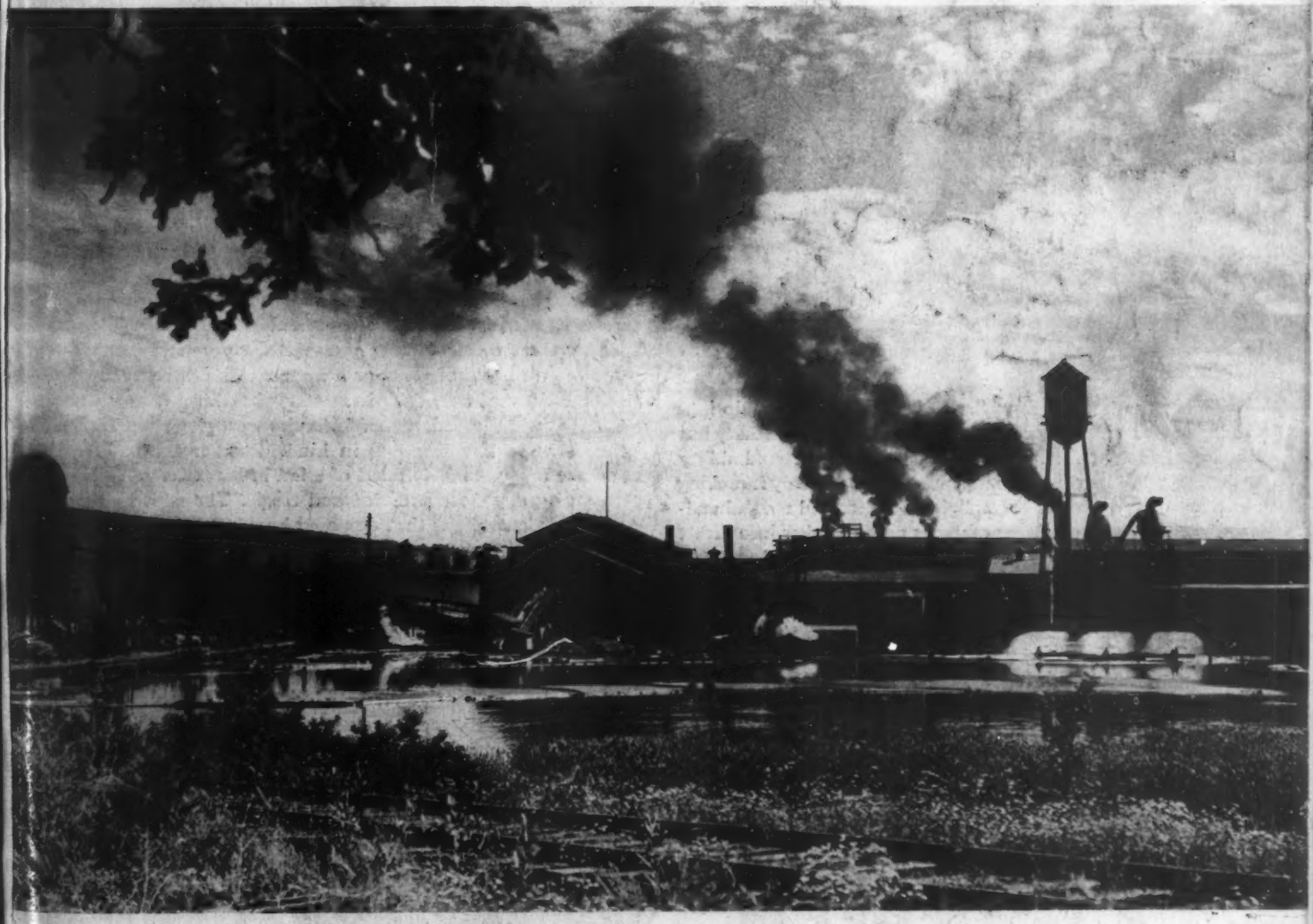

The Shop Teachers' Professional Magazine

INTO SOMETHING AS STRONG AS STEEL!

Ever since the ancient Egyptians pounded papyrus pulp into crude sheets, man has fretted at paper's easy destructibility but has done little about it. Yet today, with his new-found ability to delve into and reconstruct the molecule he not only is making paper tougher, resistant to sunlight, weather and rough handling, but is binding the fibers of paper pulp together into sheets strong enough to make airplane bazooka barrels out of, and into laminations that are actually stronger in some respects than steel.

Where lies the truth then? Is flimsy paper made strong by the addition of something else; or *do all things in the universe possess latent strength awaiting only to be revealed?* It must strike every intelligent and responsible educator that the fundamental possessions out of which a few individuals build a lifetime of achievement and happiness are shared by more than that few. "The fault, dear Brutus, is not in our stars." Always the fault lies with man's perception or the lack of it, the degree of his ability to make manifest the potentialities possessed by all. And since the future welfare of our country depends on what happens to the boys and girls of today, every responsible educator is constantly seeking ways and means of developing in his students the habits of work, the ideals and ambitions which alone lead on to victory.

There is no easy formula. But instructors in mechanical drawing for example find one dynamic at hand in the very drawing instruments their pupils use. Does it matter, some will ask, *what* instruments they use? Does it matter whether these instruments be cheap and shoddy, or echo a loving care and craftsmanship in their manufacture? Does it matter whether these tools which may serve their possessor for many years are a matter of pride or a matter of indifference to the student? As well ask, does it matter what kind of work the lad does, what standards of behavior are given him? For inevitably the boy responds in kind. Indifference too, cast upon the impressionable mind of a lad in his teens will return after many days, compounded and tragic. The added cost of *good* tools is so slight that economy here has no justification. The conscientious instructor answers this question once and for all by insisting that the student's set be the best he can afford.

★

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Designed and built for close precision work, the South Bend 9″ Precision Lathe is the ideal lathe for the production of small, accurate parts, for toolroom work, and for use wherever exactness is essential in the working of metal, plastics, fibre or other machinable materials.

Catalog 9-G illustrates in color all models of South Bend 9″ Precision Lathes, lists capacities, speeds, feeds and weights, and shows available attachments and accessories. Thirty-six pages, size 11″ x 8½″. Mailed on request, without obligation. Write today.

LARGER SIZES OF SOUTH BEND LATHES
South Bend Engine Lathes and Toolroom Lathes are available with 9″, 10″, 13″, 14½″, and 16″ swings. Precision Turret Lathes are made with ½″ and 1″ collet capacities. Information supplied on request. Specify size of lathe in which you are interested.

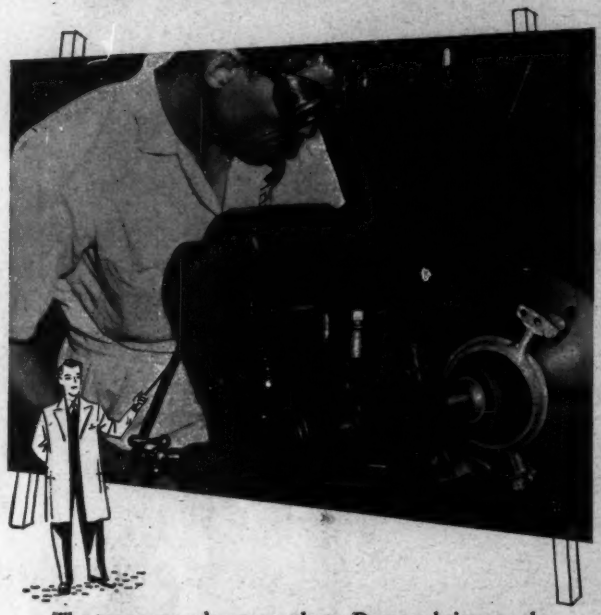
Lathe Builders Since 1906

SOUTH BEND LATHE WORKS

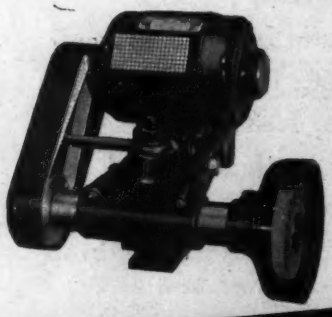
466 EAST MADISON ST. • SOUTH BEND 22, INDIANA

Teach Grinding

ON THE SAME TOOL INDUSTRY USES FOR PRECISION WORK!



The very same advantages that a Dumore brings to the production line and tool room enable you to teach grinding more effectively, more easily, and more economically. Specifically, a Dumore brings you: *Extreme precision*—accuracy to .0001". *Great versatility*—you can teach cylindrical (internal and external), surface, and thread grinding. *Long, dependable service*—thanks to rugged construction and vibrationless operation. And, fortunately, because you can mount it on any standard machine tool, a Dumore fits budgets better too! For full details, request Catalog No. 42. The Dumore Company, Tool Division, Dept. TL22, Racine, Wisconsin.



DUMORE

PRECISION AND OFF-HAND GRINDERS

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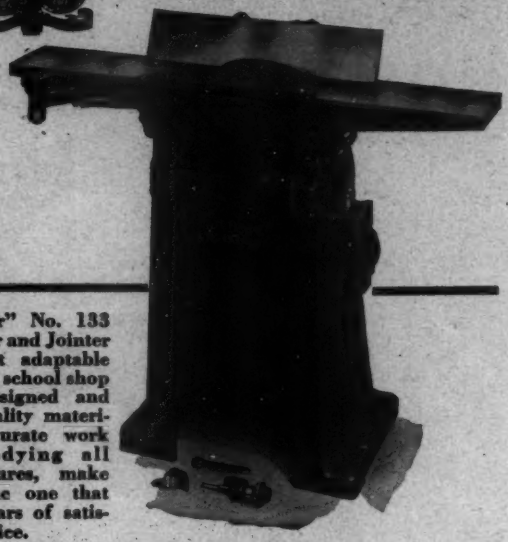
No. 133 Hand Planer and Jointer



The "Oliver" No. 133 Hand Planer and Jointer is the most adaptable machine for school shop service. Designed and built of quality materials for accurate work and embodying all safety features, make this machine one that will give years of satisfactory service.

The "OLIVER" LINE includes:

Saw Benches	Mortisers
Offstone Tool Grinders	Shapers
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Plexiglas, Lucite, Bakelite, Lumarith, Ethocel, Lignolite and Tenite II – *Now Available!*

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Booklet on Plastics Sent Free

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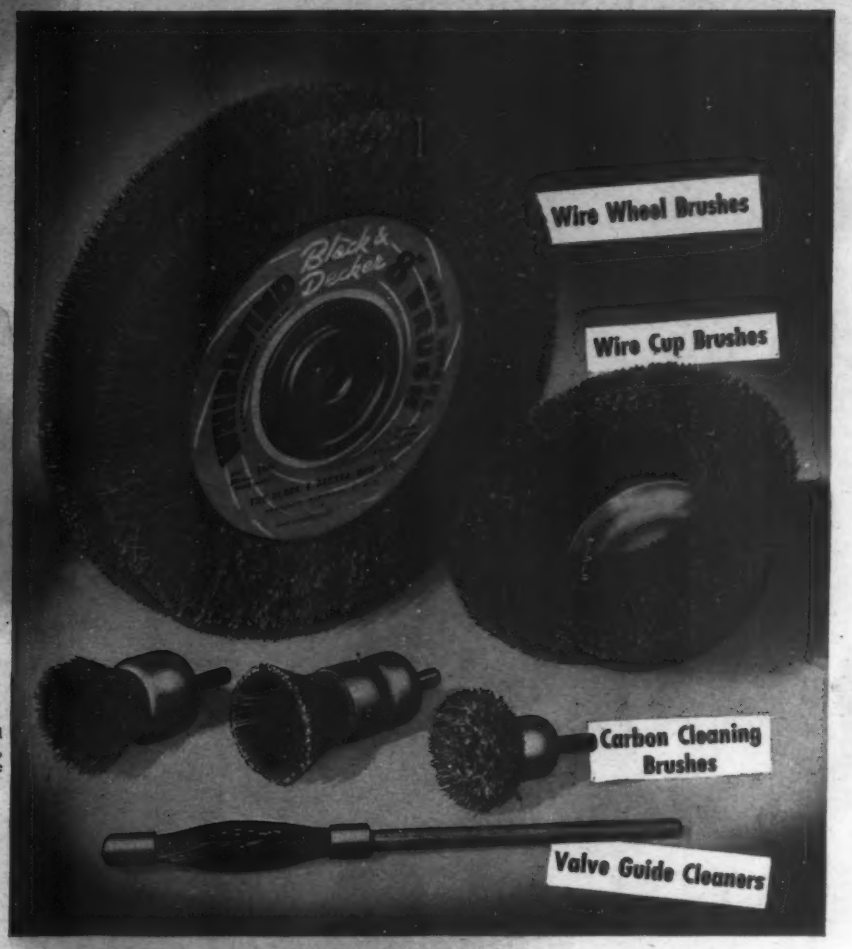
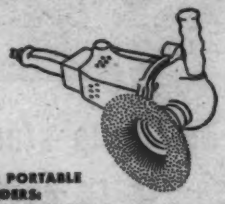
A Brush-up Lesson on Wire Brushes

They Brush off Rust, Old Paint, Scale. Scuff Tires and Tubes for Repairs. Remove Carbon at Top Speed.

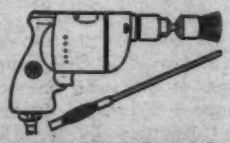


FOR PORTABLE GRINDERS: "Whirlwind" Brushes come in 4" to 8" wheel sizes; made of .014" wire for rough cleaning, .0118" wire for high-speed buffing, .005" wire for fine finishing and burnishing.

FOR BENCH GRINDERS: "Whirlwind" Brushes come in six wheel sizes from 4" to 12", in three thicknesses, and in .014", .0118" and .005" wire. Adaptors fit them to almost any arbor.



FOR PORTABLE SANDERS: "Whirlwind" Wire Cup Brushes come in 4", 5" and 6" sizes, made of .020" and .022" wire for tough cleaning jobs. Brush has ⅝", 11-thread bushing; threads on Sander spindle.



FOR ELECTRIC DRILLS: Black & Decker makes 4 types of Carbon Cleaning Brushes; 11 sizes of Valve Guide Cleaners. Arbors for using small Wire Wheel Brushes with Drills also available.

*Trade Mark Reg. U. S. Pat. Off.

BLACK & DECKER "WHIRLWIND"* Wire Brushes have so many uses throughout all industry that your students should get to know and use them. They can be used on 'most any grinding spindle, and particularly on Black & Decker Bench Grinders, Portable Grinders and Sanders.

For General Shopwork, "WHIRLWIND" Brushes quickly remove rust, old paint, scale, oxidation, light weld spatter, grease and tar . . . clean structural metal, tanks and other surfaces . . . do high-speed buffing and fine burnishing and finishing.

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For Carbon Cleaning Jobs, Black & Decker makes 4 types of Carbon Cleaning Brushes and 11 sizes of Valve Guide Cleaners. Driven by a Black & Decker ¼" Drill, they remove carbon from engine blocks and cylinder heads, clean valve ports and guides—and leave a bright, burnished surface that resists accumulation of new carbon.

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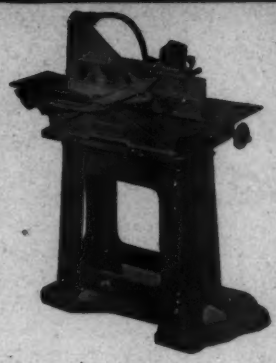
USE THE RS4A STANLEY-CARTER ROUTER

YOUR CLASSES will get a big "kick" out of making signs to be used in the classroom and school. Interesting variations can be made with this Router—signs with raised or recessed letters—and recessed letters can be filled with various colored wood fillers for contrast. The work can be done with a wide variety of woods, plastics or soft metals.

BIG THING about the Stanley-Carter Router is its ease of use and adaptability. It makes complex cutting jobs much easier... better. The 18,000 r.p.m. of its ⅜ h.p. motor gives fast, smooth workmanship. The micrometer adjustment makes cutting to exact depth easier, quicker, and safer. Lower prices on the new RS4A Router are now in effect. If you haven't one of these Routers in your shop, or want more of them, write for complete information. Stanley Electric Tools, Stanley-Carter Sales Div., 112 Elm St., New Britain, Conn.

CARTER STANLEY TOOLS

WALLACE
"MACHINE-OF-THE-MONTH"



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Direct drive at 3600 or gear drive at 5200 r.p.m.! 8" *four*-knived cutter-head with knives set askew for *shearing* cut! Taper roller bearings. Semi-steel tables, Capacity to cut ¼" deep.

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Skew-set knives take a shearing cut — does *perfect* edging work, rabbetting, beveling. Smooth, clean surfacing cuts seldom require sanding.

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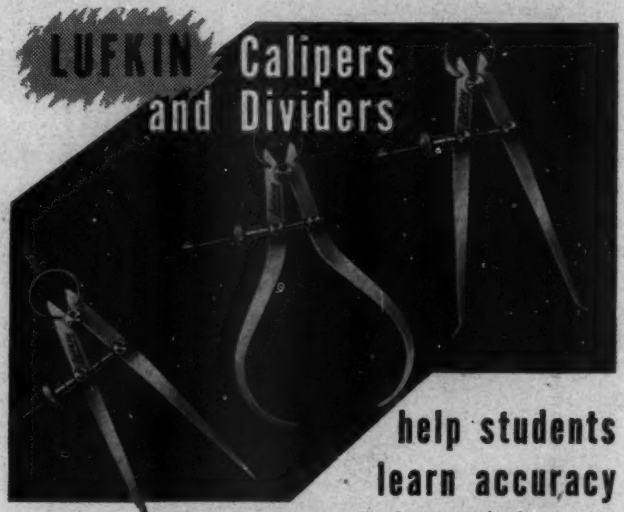

help students learn accuracy

Accuracy is best taught by proper teaching and proper tools. With careful instruction and Lufkin calipers, dividers, and other superior tools, your students will take sure steps towards precision craftsmanship. Give them the advantages of the same fine tools used throughout industry — provide them with Lufkin tools. Write for free catalog. THE LUFKIN RULE CO., SAGINAW, MICH., New York City.

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When the job requires hand filing you have to consider *time* and *labor* in the cost—not simply the price of the file.

That's why your students should know that Delta Hand Files are designed to do the job in less time, to save labor and thus reduce filing costs. Actual scientific tests have proved that Delta Files will do on the average 25% more work in the same time—with the *same* effort.

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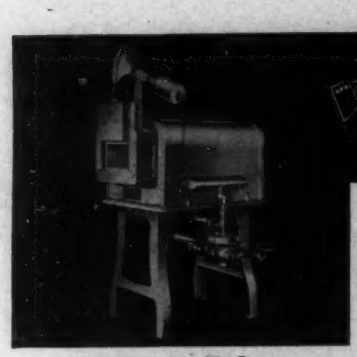

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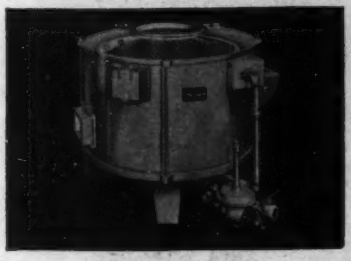
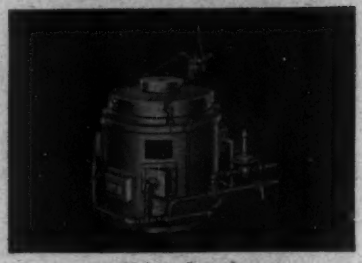


Round Pot Furnace



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Today, America Needs TURRET LATHE and SCREW MACHINE OPERATORS

The transition from tooling-up to all-out production has increased the need for turret lathe and screw machine operators. When preparing your courses to help fill this need it would be well to build them around ARMSTRONG TURRET LATHE and SCREW MACHINE TOOLS. These are provided for the basic operations, and take standard drills and knurls or cutters that anyone can quickly grind from stock shapes of high speed steel. Permanent, multiple-purpose tools, they reduce tooling-up to the selection of cutters, adjustment for clearance and tightening of set screws.

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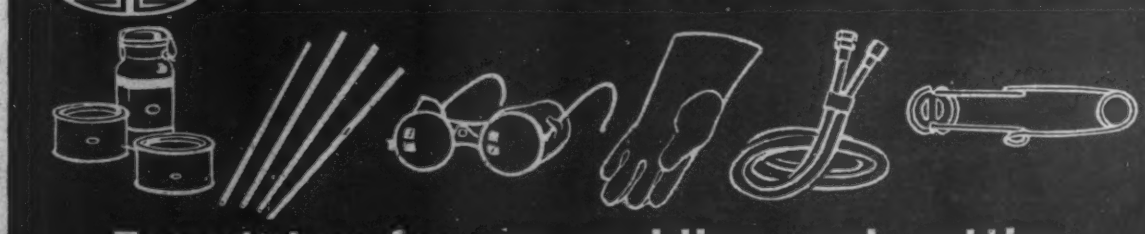
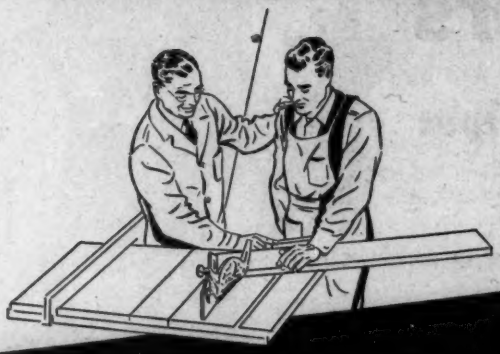


Everything for gas welding and cutting

ATKINS



Helping Pupils Get Off to a Good Start

The sooner a student gets the "feel" of tools, the easier it is to teach him, and the faster he's on the way to full mastery of a craft. Many instructors, recognizing this, equip their school shops with Atkins "Silver Steel" Saws. For they have found that the easy handling and edge-holding qualities of Atkins Saws help pupils get off to a good start by inspiring confidence in their work. Not only that, but "Silver Steel" Saws are easy on school budgets, standing up under the rigors of day-after-day classroom use. Plan to profit by these "Silver Steel" advantages. . . . Make your next saw requisition read "Atkins."

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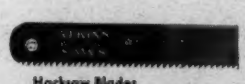
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"Silver Steel" Handsaws

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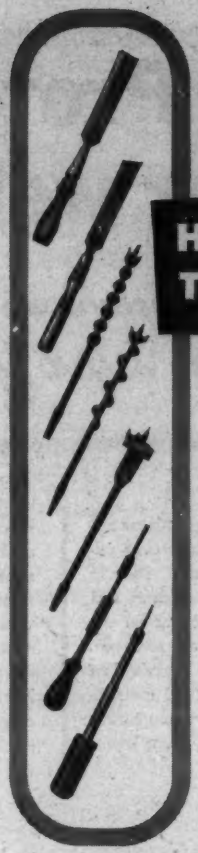

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Mean "Satisfaction" Wherever They Are Installed

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All Types

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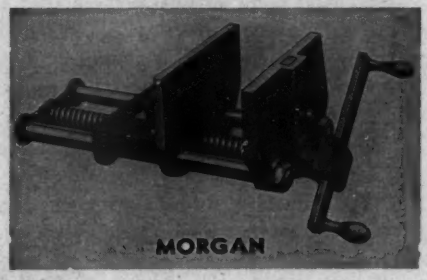

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No. 820
Quick Change
Gear Lathe

No. 840
Quick Change
Gear Turret
Lathe

SPECIFICATIONS common to all Logan Lathes: Swing over bed, 10½", Bed width across ways, 6-15/16", Bed length, 43⅛". Size of hole through spindle, 25/32", Spindle nose diameter and threads per inch, 1½"—8, 12 Spindle speeds 30 to 1450 r.p.m., size of motor ⅓ or ½ h.p., 1750 r.p.m.; Preloaded precision ball bearing spindle mounting; Drum type reversing motor switch and cord; Precision ground ways, 2 prismatic "V" ways, and 2 flat ways.

LOGAN ENGINEERING CO.

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SKILSANDERS

● Belt Type SKILSANDERS are so light in weight, so powerful, compact and perfectly balanced that they make it easier for any student to accomplish fine finishing faster on all flat surfaces of wood, metal or compositions.

And to help you keep your shop costs in line, SKILSANDERS are *quality-built* throughout to last longer and operate for less with a minimum of servicing.

Let your distributor show you on your own work why Belt Type SKILSANDERS belong in your manual training shop. Phone him today for a demonstration.

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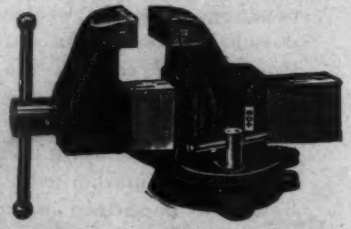

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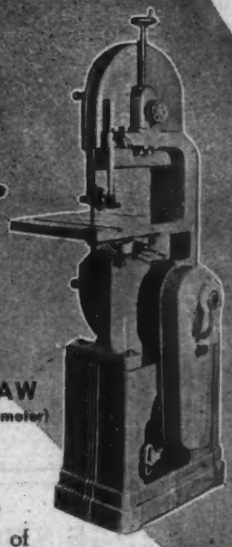

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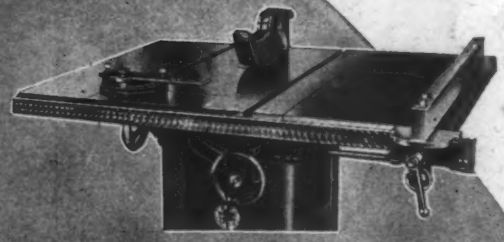

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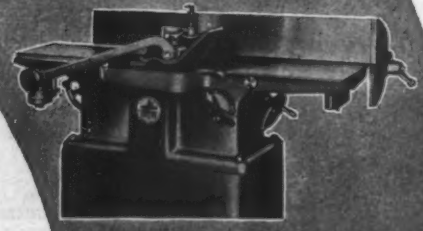

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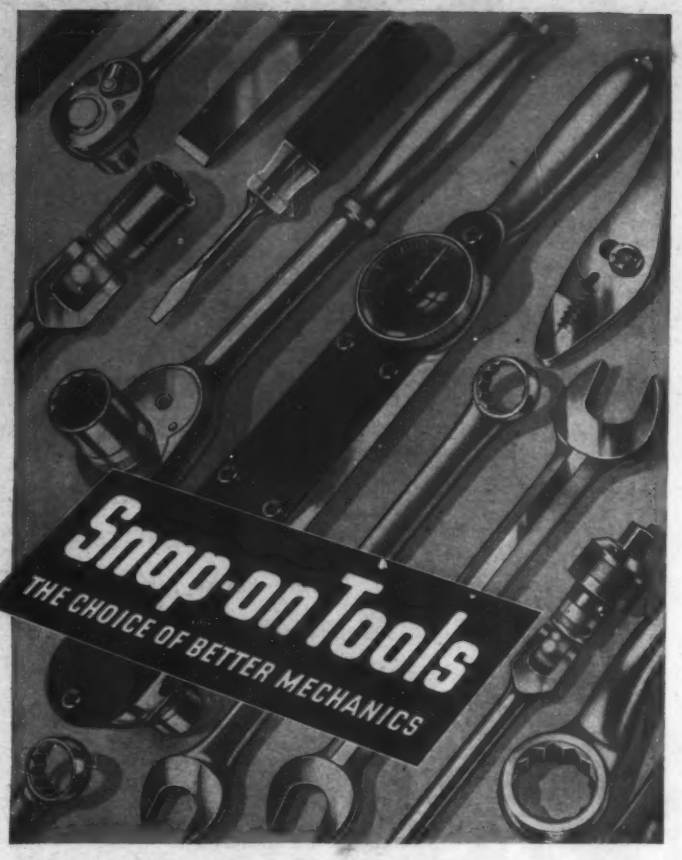

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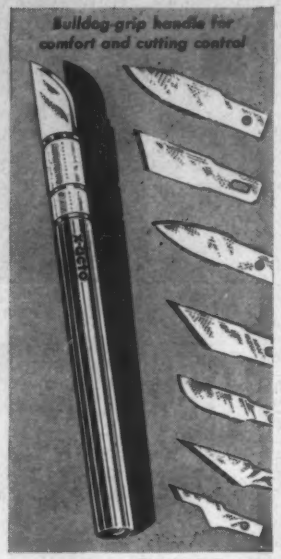

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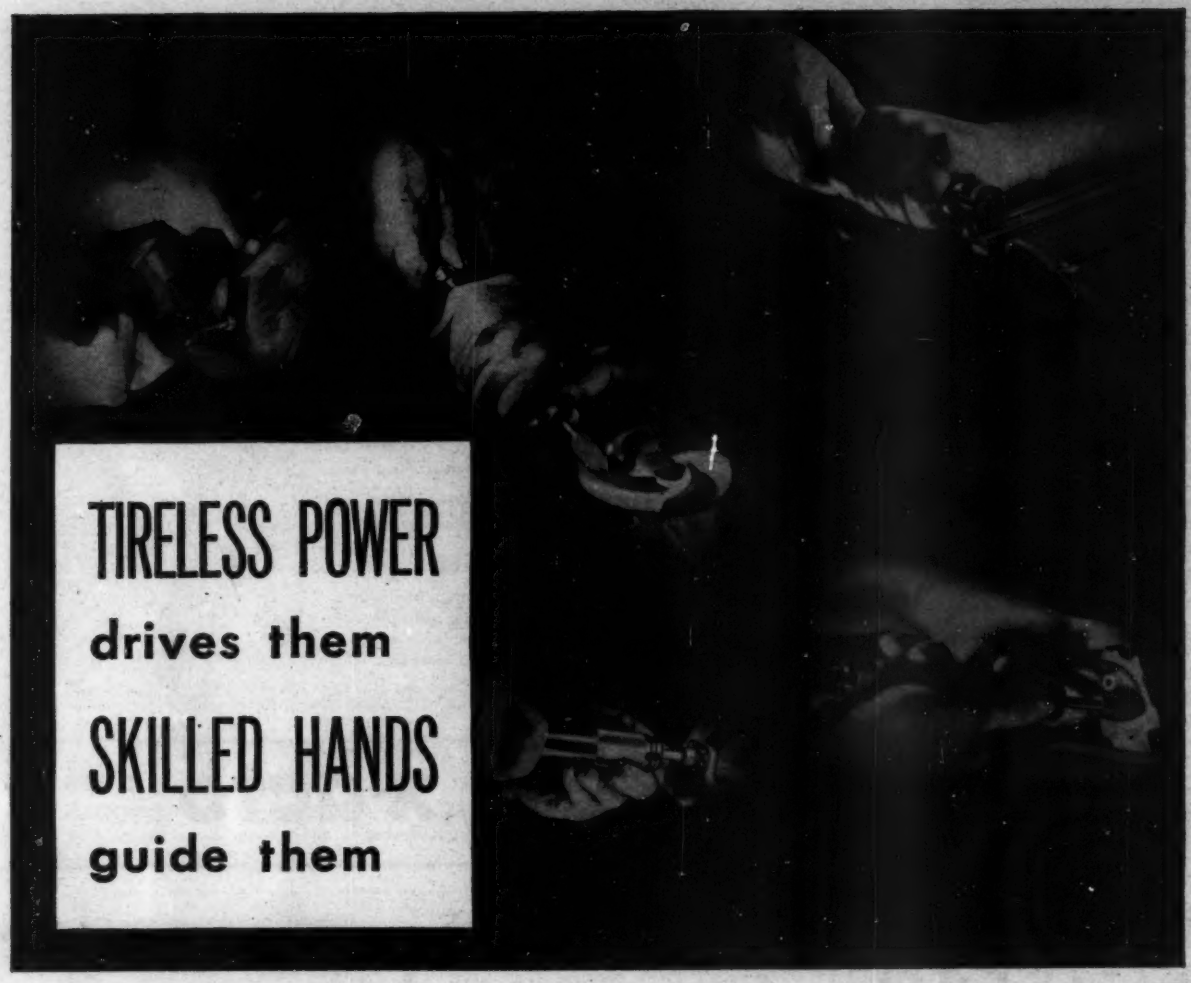

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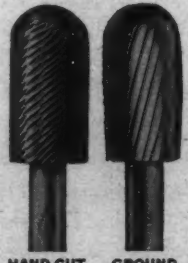

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In This Issue

There are a number of very helpful articles in this issue which should be placed in the "must" category by every teacher of industrial arts and vocational education. Among these are the following: "Aptitude Tests for Placement of Industrial Trainees," by Laurence W. Ross; "Determining Future Vocational-Educational Needs," by Earl M. Bowler; "Translating a Philosophy into Practice," by H. A. Jones; and "Basic Information for the Co-ordinator of Diversified Occupational Programs," by Murray Banks and William G. Slattery.

Other articles which should be of great interest are "Gladly Teach," by Thomas A. Hippaka; "Advice to the Beginning Teacher," by Floyd R. Love; and "The Successful Industrial-Arts Teacher," by P. E. R. Ammons.

Among the projects and problems, the ten-inch bench saw project by William A. DeVette deserves special mention because it provides excellent work assignments for the drafting room, the pattern-making shop, and the machine shop. R. Randolph Karch's "An Explanation of Point Size in Type" presents some fine related subjects material for the print shop. The "Dutch Colonial House," by J. Edgar Ray, also provides useful material for those who are teaching architectural drawing, while Burl N. Osburn's "Design for the Teacher of Industrial Arts" furnishes two more excellent plates on design which can be profitably studied by every industrial-arts teacher.

The whittlers, of course, will find pleasurable relaxation in Ben Hunt's latest contribution.

This Month's Cover

The cover picture chosen for the December number of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION depicts the great lumber mills of the McNary Lumber Co., McNary, Ariz., where the lumber from the Arizona forests are processed to be sent out to satisfy the many needs of the modern world.

The Annual Index

This issue is the closing number of Volume 34 of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

Many readers bind the separate monthly issues into a single volume. These readers naturally will want to get an index to be bound in with the monthly issues. There are others, too, who may want the annual index.

Since only a limited number of these indexes will be printed, readers are asked to send in for their copy as soon as possible.

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EASTERN OFFICE: 330 WEST 42ND ST., NEW YORK 18, N. Y.

VOL. 34, NO. 10 DECEMBER, 1945

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Entered January 2, 1914, as Second-Class Mail Matter at Milwaukee, Wis., under Act of March 3, 1879. Copyright, 1945, by The Bruce Publishing Co. Title registered as Trade Mark in U. S. Patent Office, November 25, 1930. Published monthly except during July and August.

Subscription Information. — Subscription price, $2.50 per year, payable in advance, Canadian postage, 25 cents; Foreign Countries, 50 cents. Copies not over three months old, 35 cents; more than three months, 50 cents.

Discontinuance. — Notice of discontinuance of subscription must reach the Publication Office in Milwaukee, at least fifteen days before date of expiration. Notices of changes of address should invariably include the old as well as the new address. Complaints of nonreceipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

Editorial Contributions. — The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

Articles Indexed. — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

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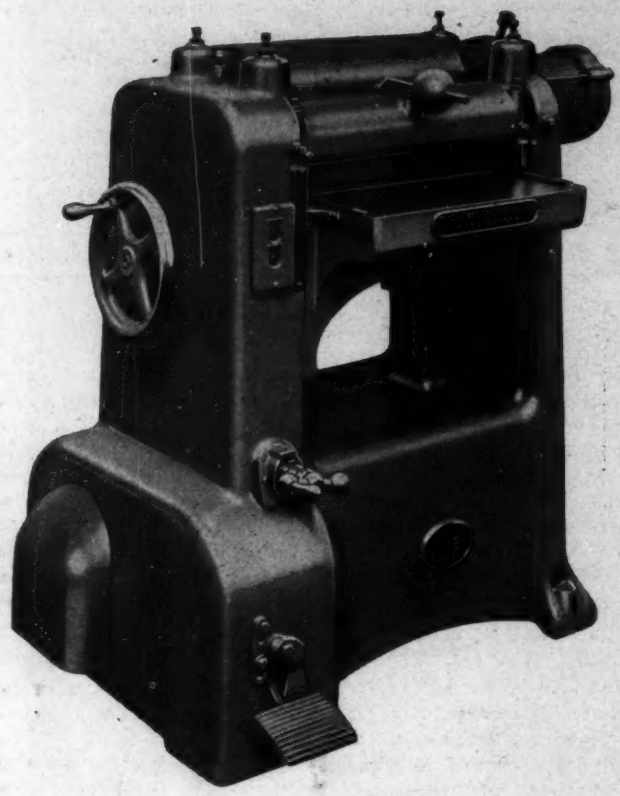

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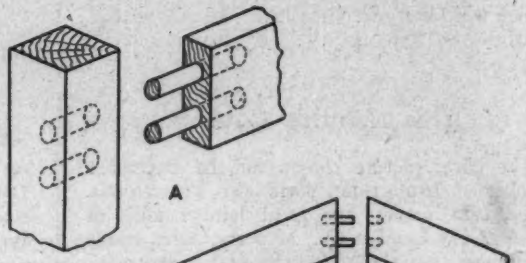

DOWEL JOINT

The dowel joint is easily and quickly made. One of its most common forms is the end-to-edge or butt dowel joint (A) which is often used instead of the mortise-and-tenon joint. It is generally quite strong since there is little possibility of weakening it by removing too much stock. Another form is the doweled miter joint (B), especially useful in joining the corners of large, plain frames. Both are extensively used in furniture construction.

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Aptitude Tests for Placement of Industrial Trainees

*Laurence W. Ross**

With the advent of World War II, the industrial forces of this country set about, as no nation has done before it, to produce all manner of mechanisms and supplies for the fighting fronts. To meet the urgent and unprecedented need for new and additional labor, industry was forced to turn to new sources of labor, largely to be found among unskilled men and women.

Since the summer of 1940 and up to very recently, industry has been served by a great program of emergency vocational education for national defense and war production, largely financed by the Federal Government but through state and local school channels. Public school facilities for vocational training were expanded to care for trainees in machinist, welding, auto mechanical, aviation, shipbuilding, textile and numerous other industrial skills.

Problem of Placement

Directors of defense training programs were faced from the outset with the problem of selecting the most trainable and most employable candidates for enrollment in vocational classes for war-production training. Furthermore, in large programs offering a variety of classes, the assignment of recruits to courses of training for which they appeared most suitable presented the problem of adequate placement. In order to establish a scientific method of selection and placement to economize in the expenditure of both man power and money the Greenville, S. C., Defense Training Program conducted an experimental program in the use of standardized mechanical aptitude tests for these purposes. Applicants for training in the vocational classes for adults were interviewed according to an adopted procedure and then were given a battery of tests considered likely to be most applicable to the courses available in either the Greenville City or Parker District Defense programs.

In the Greenville area there were adult classes in machine-tool operation, welding, auto mechanics (white and Negro), electrical repair and maintenance, machine molding, and shipfitter-helper courses. For a period of eight months an interviewer and part-time assistants interviewed prospective enrollees in all these courses, at the same time applying individual tests of mechanical aptitude. As a result of this screening process much data have been accumulated in evidence of the relationship between test scores and subsequent achievement in the training courses that were conducted at Greenville. The data have been made available upon request to other training centers, notably in South Carolina, and descriptions of the tests, methods employed and tentative results have been reported in INDUSTRIAL ARTS AND VOCATIONAL EDUCATION (September, 1942). It is the purpose of this article to report conclusive results, including critical scores, correlations, and decile norms in the hope that these experiences will be of more widespread usefulness in future trainee selection and placement in industry and vocational education.

Aptitude Tests for Prediction of Success

Aptitude tests are designed to (1) analyze the individual in order to obtain a profile of his aptitudes and limitations, and (2) aid in the prediction of his likely capacity for training in a specific field and his chances for success in the occupation after completing the course of training. During the wartime emergency, when so many applicants for this training were unskilled in any mechanical direction, aptitude tests were particularly important, since they could in the course of an hour or two reveal information which otherwise would be gained only at the needless expense of hiring and placing first, and learning later by trial and error. General intelligence tests are also useful in this respect in that they are generally predictive of the individual's capacity to learn.

Mechanical aptitude tests are of two types: (1) group pencil and paper tests, either of the type which tests degree of information on mechanical matters, or of the type which tests understanding of generalized mechanical principles; (2) tests of manual dexterity or of assembly, individually administered. It is thought that these different types of individual tests indicate patterns of traits or qualities which are predictive of the individual's capacity to do a particular kind of work involving the traits revealed by the test performance. Test data are not used in isolation, but rather along with other information on the individual gathered by means of an interview.

The Greenville Testing Program

In the defense classes in the Greenville area the interviewer and others administering the tests held personal interviews with each applicant and enrollee, applying individual tests of the manual type at the same interview. Group tests of the written variety were arranged as occasion offered; an hour was given over to interviewing and testing each trainee or applicant, exclusive of the time required for the subject's later participation in two or three more of the group pencil and paper tests. In all instances the interviews for obtaining personal data (to throw light on the test date, as well as to serve later for placement records) preceded the testing, and consequently the interviewer had ample opportunity to get on good terms with the person being tested and thus enlist proper co-operation. Since many of the persons tested were already enrolled in classes when the program was initiated, the testing program was somewhat experimental, de-

*Union Bag and Paper Co., Industrial Relations Division, Savannah, Ga.

Applying tests to trainees for shipfitter-helper — Greenville City Schools

Applicants taking tests

pending upon enrolled trainees for normative data.

Tests Used

Standardized tests upon which norms were established on a nationwide scale were chosen for the testing and placement. Pencil and paper tests of the booklet type included:

The Army Alpha Test (Wells Revision)
The Army Beta Test (Kellogg and Morton Revision)
L. J. O'Rourke Mechanical Aptitude Test, Junior Grade
Minnesota Paper Form Board Test

Manual dexterity and assembly tests included:

The Minnesota Spatial Relations Test
The O'Connor Finger Dexterity Test
The O'Connor Tweezer Dexterity Test

(For a description of each of these tests refer to "Pre-Selection and Classification of Trainees for Defense Classes," INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, September, 1942.)

It had been planned originally to give the individual enrollee and applicant each of the tests just listed in order to establish local norms, and, upon his completion of the course, compare his scores on the tests with his earned mark or class ranking. The resulting correlations between test scores and evidences of success or failure might be expected to reveal relationships in some cases close enough to warrant the use of individual tests or combinations of tests in prediction for selection and placement purposes. In practice it developed that because of dropouts and the time factor it was impossible to give every person every test; however, much valuable data was collected, especially for the establishment of critical scores on certain individual tests. The critical scores presented here are valuable indicators of the usefulness of particular tests for selection and placement purposes.

Results of the Greenville Testing Program

Critical Scores: In an effort to determine whether there might be a pronounced relationship between scores on any of the tests and performance in training classes scatter diagrams were plotted for each of the tests in relation to marks assigned at the end of the course. This was done for all classes except that in machine molding, where it was impracticable. The importance of the scatter diagrams to this study lies chiefly in these charts.

A *critical score* may be defined as a score which distinguishes between probably successful and unsuccessful candidates. In the figures presented in the material which follows, it should be observed that candidates obtaining marks of *D* and *E* are definitely unsuccessful, whereas those obtaining marks of *A* and *B* may be considered definitely successful; *C* candidates are only fairly successful (and in the past would have been rejected by most industries, unless it were seen fit to retain them on a probationary basis). In the charts we have attempted to find points which seem to draw a line between these successful and the unsuccessful candidates. For example, if the majority of the *D* and *E* trainees scored below a certain point in the range of scores of a given test, then such a point may be considered a useful critical score; for if we had given that test before the candidate had begun the course and had adjudged him to be probably unsuccessful the chances are good that this prediction would have been borne out eventually.

In this manner the relationships were sought between the following pairs of variables (that is, marks and some test):

Welders

Marks and Beta Test
Marks and Finger Dexterity Test
Marks and Spatial Relations
Marks and O'Rourke Mechanical Aptitude Test
Marks and Alpha Test
Marks and the Minnesota Paper Form Board

Machine — Tool Trainees

Marks and Alpha Test
Marks and Beta Test
Marks and Spatial Relations
Marks and Finger Dexterity Test
Marks and O'Rourke Test of Mechanical Aptitude
Marks and the Minnesota Paper Form Board

Shipfitter Helpers

Marks and Beta Test
Marks and O'Rourke Test
Marks and the Minnesota Paper Form Board
Marks and Finger Dexterity Test
Marks and Spatial Relations

Machine Molders

Class Rank and Alpha Test
Class Rank and Finger Dexterity
Class Rank and Tweezer Dexterity
Class Rank and Spatial Relations
Class Rank and Beta Test

Electrical Maintenance and Repair Trainees

Marks and Alpha Test
Marks and Finger Dexterity
Marks and Spatial Relations
Marks and O'Rourke Test of Mechanical Aptitude
Marks and Beta Test
Marks and the Minnesota Paper Form Board

Auto Mechanics

Marks and Beta Test
Marks and O'Rourke Test of Mechanical Aptitude
Class Rank and Finger Dexterity
Class Rank and Spatial Relations

Critical Scores for Welders

In the scatter plot shown in Figure 1 for the *Beta Test*, it is impossible to draw a definite line separating successful and less successful trainees in the welding course. Reading along the top line of scores, then downward to the tabulations we can see that if we rejected all candidates scoring below 60 on this test, we would reject 3 unsuccessful candidates, 3 fairly successful candidates, and 1 successful candidate. In industry this would in normal times be considered a good critical score, as employers were not until recently concerned with the loss of a few good prospective employees so much as with the assurance

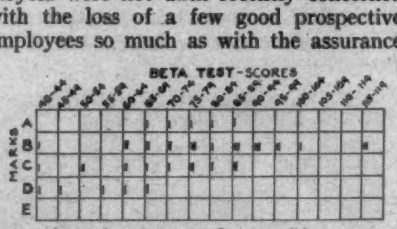

Fig. 1. Scores for welders

that all who were employed should be successful.

The *Finger Dexterity Test* is more selective, as Figure 2 reveals. If we selected all who completed this test in less than 300 seconds, rejecting the remainder, we would thus select over 90 per cent of the successful candidates, at the same time rejecting 85 per cent of the unsuccessful. An interesting point is that the test selects all the *A* candidates, as well as the lone *E* candidate.

The *Paper Form Board* test in Figure 3 shows a good critical score at the 20th centile point. At this point the test would have selected 92 per cent of all successful candidates, and would have rejected 70 per cent of the unsuccessful candidates.

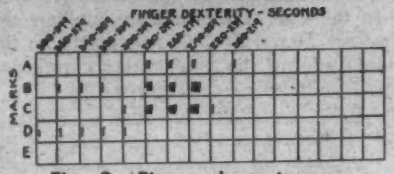

Fig. 2. Finger dexterity test

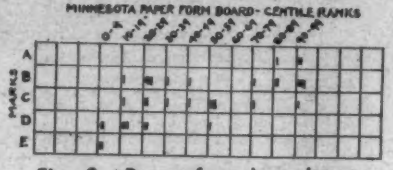

Fig. 3. Paper form-board test

Throughout this discussion, in order to see more clearly the merits of these tests for purposes of selection, it should be borne in mind that these tests were tried out on people already selected by a method somewhat better than chance selection. It is therefore plausible to believe as we read

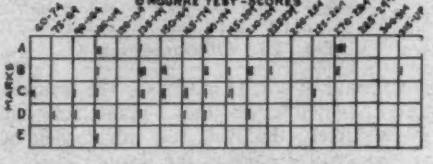

Fig. 4. Mechanical aptitude test

along that these tests have considerable merit over chance interview methods. All of the failures mentioned here were actually taking up the teacher's time and the class equipment at the time these tests were applied.

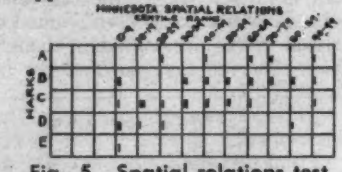

Fig. 5. Spatial relations test

By reference to Figures 4 and 5 it is observed that the *O'Rourke Mechanical Aptitude Test* and the *Spatial Relations Test* are less selective for welders than the tests previously discussed. They would not reject enough of the unsuccessful trainees.

Critical Scores for Machine Tool Trainees

The *Beta Test* is a better predictor of success than Figure 6 indicates, for it must be admitted that this group was largely preselected on the basis of educational background. If a critical score point is set at a score of 60, then 100 per cent of the

Fig. 6. Scores for machine-tool trainees

successful applicants would have been selected by this test, and 50 per cent of the unsuccessful applicants. This chart reveals a rather close correlation between the score and class marks.

The *O'Rourke Test* (Fig. 9), with a critical score at 175, would have selected 93 per cent of the successful candidates. The *Finger Dexterity Test* also appears very useful here (Fig. 10), since a critical score of 305 seconds would permit the loss of only two successful candidates who took the test.

Fig. 7. Spatial relations test

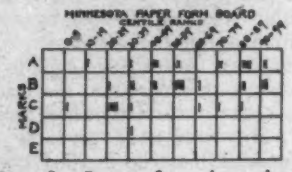

Fig. 8. Paper form-board test

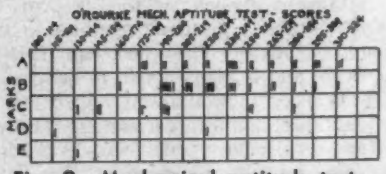

Fig. 9. Mechanical aptitude test

Fig. 10. Finger dexterity test

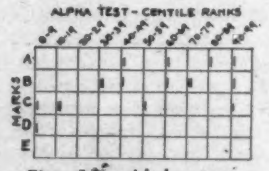

Fig. 11. Alpha test

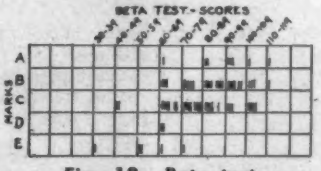

Fig. 12. Beta test

The *Spatial Relations Test* reveals slightly less clear-cut results than the foregoing tests if a critical score were set at the 30th centile point. The *Minnesota Paper Form Board* is even less selective, but some evidence of relationship is clear from Figure 8.

In general, it may be said that the differentiating qualities of all these tests would be more apparent if these particular candidates had not been handpicked in the first place.

Critical Scores for Shipfitter Helpers

The *Beta Test* (Fig. 12) would, with a critical score of 60, select well over 90 per cent of the successful candidates, rejecting about 40 per cent of the unsuccessful. The *O'Rourke* will do better. With a

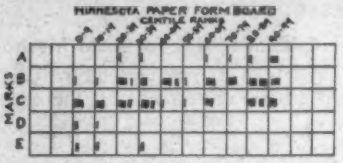

Fig. 13. Paper form-board test

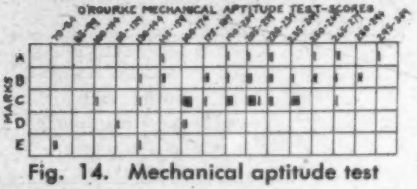

Fig. 14. Mechanical aptitude test

critical score of 145 (see Fig. 14) the test would reject over 70 per cent of the unsuccessful, while selecting over 90 per cent of successful candidates. While the *Finger Dexterity Test*, in Figure 15 reveals evident relationship, it is not so selective, except among the *A* candidates.

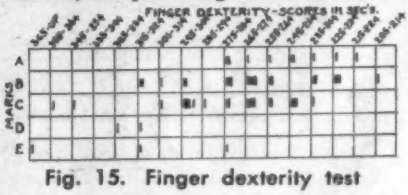

Fig. 15. Finger dexterity test

The *Minnesota Paper Form Board* is somewhat disappointing in that it does not distinguish clearly among the *C* candidates (Fig. 13). While the *Spatial Relations* (Fig. 16) does select the most capable candidates, it does not separate clearly among the lower brackets.

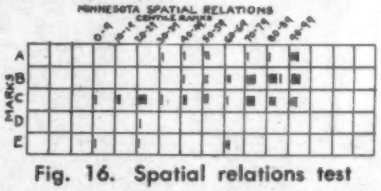

Fig. 16. Spatial relations test

Critical Scores for Electricians

With the trainees in electrical repair and maintenance it is apparent that the *O'Rourke* test (Fig. 18) is the most useful, since it would, with a critical score of 85, separate 80 per cent of the unsuccessful candidates from the successful, and at the same time pick 90 per cent of the successful candidates. The same criticisms as with the machine-tool trainees applies here, except in reverse; this group of elec-

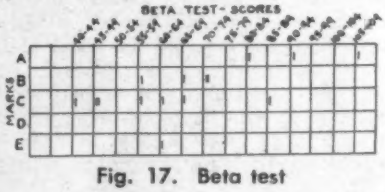

Fig. 17. Beta test

tricians was preselected in that it was largely composed of WPA workers bordering on the unemployable. In other words, the group is not well enough distributed to show the true relationship of tests and class marks in ordinary samplings of people.

Critical Scores for Auto Mechanics

The *Beta Test* provides us with an excellent critical score point for the selection

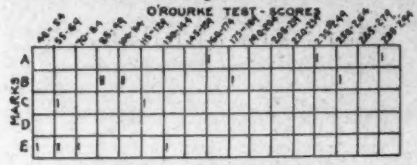

Fig. 18. O'Rourke test

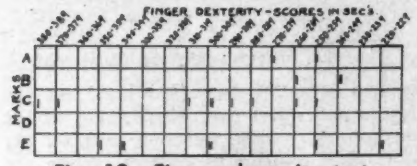

Fig. 19. Finger dexterity test

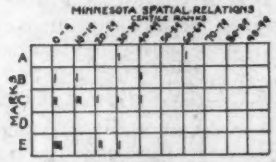

Fig. 20. Spatial relations test

of auto mechanic trainees at a score of 45. If this point were used as a critical score it is apparent from Figure 22 that eleven (or 85 per cent) of the unsuccessful candidates would have been rejected, and only two fairly successful trainees would have been lost; 93 per cent of the successful candidates would have been selected.

The *O'Rourke Test* also shows promise of usefulness, but to a lesser degree. With a critical score of 75, all but one of the unsuccessful candidates would have been rejected. However, three fairly successful and one very successful candidate would also have been rejected.

While the *Spatial Relations Test* bears some relationship to class performance, it would fail to eliminate two *D* trainees who attained relatively high percentile rankings.

Test Scores and Training in Machine Molding

It was found to be impossible in the case of the classes in machine molding to develop critical score areas for any of the tests. This was because it was felt at the time that the teacher in these classes was more able to rank students or trainees than to give them marks as the other teachers were able to do; the teachers in those courses was a practical worker in his respective occupation, and was loath to try to give marks in the 5-point (A-B-C-D-E) scale as is so customary in ordinary school teaching. It was therefore found for the present to be more suitable to rank the trainees according to their standing in their respective classes, and these rankings were used in working out correlations between class performance and test scores by the method of rank-differences. In this method (H. E. Garrett, *Statistics in Psychology and Education*, pp. 360–63) rho is computed as the rank-order coefficient of correlation, and it is then transmuted into product-moment-r by means of an inference table (Garrett, p. 362). Since the numbers represented here are small, the results are obliged to be interpreted with caution in any event.

The candidates for classes in machine molding were given the following tests:

The O'Connor Finger Dexterity Test
The O'Connor Tweezer Dexterity Test
The Army Alpha (Wells Revision)
The Minnesota Spatial Relations Test

Practically no correlation was found to exist between class standing and performance on the *Finger Dexterity Test*, the relationship being represented by $r = .05$.

Performance on the *Minnesota Spatial Relations Test* seemed to exhibit more relationship with progress in the machine-molding class; the relationship here was $r = .25$, but with large probable error. (Here again it must be recalled that this group was fairly well selected.)

Strangely enough in the case of the *Army Alpha* a negative relationship was found to exist. The coefficient here is $r = .39$, and is high enough to be of some significance. It would not appear to be remarkable if the correlation between *Alpha* performance and success in machine molding were around zero, as there is not necessarily any correlation between intelligence and the peculiar combinations of delicate touch and quality of patience so desirable in the specific tasks of this job. The fact that machine molding is a job done in dirt and perspiration and the fact that several of the trainees were intelligent to a high degree possibly combined to produce a situation where stolid patience led to extreme success at one end of the scale, whereas the high order of intelligence led to distaste and lack of success at the other end of the scale. The effect of these few extreme cases would not have been so apparent in a sufficiently larger sample of these trainees.

In the case of the machine molders the *Tweezer Dexterity Test* appears to be the most useful of the tests, with a correlation

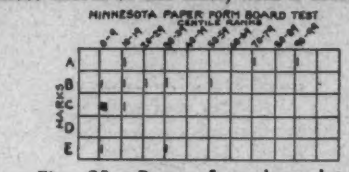

Fig. 21. Paper form-board test

Fig. 22. Beta test

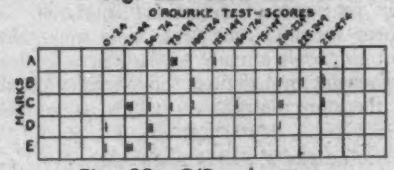

Fig. 23. O'Rourke test

coefficient of .52. If marks for the trainees were available on the 5-point scale it seems likely that this test might yield a useful critical score in the future.

Summary of Critical Scores

The relationships found to exist between success in various defense classes and scores attained upon standardized tests are summarized as follows in terms of critical score points for each test as applied to each kind of class. In the case of the Machine-Molders, as has been pointed out, no critical scores are available, though it has been observed that the *Tweezer Dex-*

Class	*Test*	*Critical Score Point*
Welding	Beta	60
	Finger Dexterity	300
	Paper Form Board	20th centile
	Spatial Relations	
	O'Rourke	
	Alpha	65 (not very useful)
Machine Tool	Beta	60
	O'Rourke	175
	Finger Dexterity	305 seconds
	Spatial Relations	30th centile
	Paper Form Board	(No clear-cut point)
	Alpha	20th to 30th centile point
Shipfitter Helpers	Beta	60
	Paper Form Board	20th centile
	O'Rourke	145
	Finger Dexterity	314 seconds
	Spatial Relations	25th centile
Electricians	O'Rourke	85
	Beta	(No clear-cut point)
	Spatial Relations	(No clear-cut point)
	Finger Dexterity	(No clear-cut point)
	Paper Form Board	(No clear-cut point)
	Alpha	30
Auto Mechanics	Beta	
	O'Rourke	
	Spatial Relations	40th centile (not very useful)

TABLE I. BETA TEST SCORES
(Decile Ranks for Defense Trainees)

Decile	Auto mechanics	Welders	Machine-tool operators	Electrical repair	Machine molders	Shipfitter helpers	All trainees
	N=47	N=56	N=43	N=17	N=22	N=109	N=289
10th	104	120	111	106	100	120	120
9th	93	94	103	92	84	104	101
8th	86	87	99	84	82	100	94
7th	79	83	96	73	77	92	89
6th	71	80	94	69	70	88	84
5th	63	76	91	66	63	84	80
4th	58	72	88	63	61	80	74
3rd	52	68	84	59	58	74	67
2nd	45	63	81	56	55	68	61
1st	30	54	71	45	52	62	50

TABLE II. MINNESOTA SPATIAL RELATIONS TEST
(Decile Ranks for Defense Trainees)
Time Scores in Seconds

Decile	Auto mechanics N=23		Welders N=51	Machine operators N=48	Electrical repairmen N=25		Machine molders N=24	Shipfitter helpers		All trainees	
	Boards A & B		Boards C & D	Boards C & D	Boards A-B	Boards C-D	Boards A & B	Boards A-B	Boards C-D	Boards A-B	Boards C-D
10th	449	350	400	550	500	550	300	350	300	350	
9th	478	473	453	607	620	610	488	415	527	472	
8th	530	569	516	640	720	670	522	480	605	472	
7th	573	577	582	695	780	712	503	542	657	566	
6th	610	590	601	730	880	736	606	590	722	593	
5th	687	602	625	775	999	800	630	637	782	621	
4th	722	634	649	820	1060	840	746	666	856	653	
3rd	755	716	710	855	1120	895	792	696	921	723	
2nd	920	810	745	910	1180	1010	860	730	1041	807	
1st	1042	955	838	942	1580	1090	1095	755	1262	926	

TABLE III. O'ROURKE TEST SCORES
(Decile Ranks for Defense Trainees)

Decile	Auto mechanics	Welders	Machine tool	Electrical repairs	Shipfitter helpers	All trainees
	N=40	N=56	N=66	N=19	N=	N=340
10th	280	325	325	321	325	325
9th	224	272	289	281	271	272
8th	207	233	264	243	247	239
7th	166	208	248	182	230	227
6th	100	195	237	123	217	209
5th	85	181	224	104	208	196
4th	66	161	208	101	196	177
3rd	46	139	199	82	178	148
2nd	32	116	192	63	160	110
1st	20	103	172	44	130	70

TABLE IV. MINNESOTA PAPER FORM BOARD TEST SCORES
(Decile Ranks for Defense Trainees)

Decile	Welders		Machine-tool operators		Electrical repairmen (WAP only)	Shipfitter helpers		All trainees	
	Age 16–25	Age 26–60	Age 16–25	Age 26–60	Age 16–60	Age 16–25	Age 25–60	Age 16–25	Age 26–60
	N=16		N=14	N=14	N=16–60	N=139		N=139	
10th	55	50	55	45	51	60	46	60	55
9th	52	45	44	40	38	50	44	51	44
8th	50	42	40	36	33	44	41	45	39
7th	48	34	34	33	22	40	38	41	35
6th	45	32	33	31	18	37	35	37	32
5th	30	29	32	30	16	35	32	34	29
4th	20	27	31	27	14	31	30	30	26
3rd	14	25	30	34	12	28	26	26	22
2nd	11	21	26	21	11	24	22	22	17
1st	5	17	23	18	7	18	13	17	10

terity Test is useful in spotting qualifications applicable to the learning of this skill.

Test Norms

We have already presented and tested *critical scores* in their relationship to the selection and assignment of trainees to various types of industrial training. In the interpretation of test scores on one test as compared with scores on another test the raw scores have very little meaning by themselves. Scores on one test may range from 20 to 90 out of a maximum of 120 or so points; on another test scores might range 300 to 800 seconds for the same group of people. Scores obviously cannot be compared with each other on this basis.

The easiest way for us to get over this difficulty is to interpret the scores by comparing them with scores of some specified group, and attach meaning to them in the light of the performance of this standard group. These results constitute the *norms* for the test.

Percentiles

Scores are most easily interpreted if they are converted to *percentile* ranks in terms of the *norms* from standardized group performance. The percentile rank corresponding to a given score shows the per cent of a particular group making scores less than a given score. *Decile* points are simply percentile ranks abbreviated to an expression of 10 points, representing the 10th, 20th, 30th, etc., percentiles as 1st, 2nd, 3rd, decile, etc.

Referring to Table I, which represents the testing experience for the Beta Test in Greenville, it will be noted that for the auto mechanics a score of 63 represents the 5th decile (or 50th percentile), which is the median performance of the group. This means that of the 47 auto mechanics who took this test anyone making a score of 63 exceeded the score of 50 per cent and, in turn, was exceeded by 50 per cent. Similarly anyone making a score of 86, at the 8th decile point, exceeded the performance of 80 per cent of the group and, in turn, had a lower score than 20 per cent of the group. Individual performance in other groups on this and other tests may be similarly interpreted.

Interviewers and other officials who interpret test scores can easily understand how any given test score compares with the average of applicants and trainees in general, or other groups in which they may be interested. This method makes it possible to explain scores of the various tests in uniform terms, a thing that cannot be done ordinarily by means of raw scores.

Comparisons of Average Scores for Various Groups

In the tables which follow, the decile ranks are, therefore, given for the dual purpose of (1) serving as *norms* for each mechanical group and (2) serving as points of comparison of average scores for the various groups.

In Table I, which represents the testing experience for the Beta Test in the Greenville classes, it will be noted that at the median, or 50th percentile point, the auto mechanics had an average score of 63, the welders 76, machinists 91, etc. What this means is that in Greenville it has been proved that these trainees, by far the majority of whom may be considered successful, are represented by these levels of test performance. In other words, the machinists have the highest amount of the abilities represented by the Beta Test. By reference to Tables III and V it may be observed that machinists also have the highest averages on the O'Rourke and Finger Dexterity tests. On the other hand it is observable in Tables I, III, and V that welders do not make such high scores, nor do they need to. In fact, experience in

TABLE V. FINGER DEXTERITY TEST SCORES (SECONDS)
(Decile Ranks for Defense Trainees)

Decile	*Welders*	*Machine tool*	*Electrical repair*	*Shipfitter helpers*	*All trainees*
	N=53			*N=63*	*N=348*
10th	210	200	219	200	200
9th	242	223	248	239	235
8th	249	246	250	246	249
7th	255	253	259	253	257
6th	262	257	276	263	266
5th	269	262	300	270	276
4th	273	269	303	276	286
3rd	285	272	309	297	303
2nd	308	282	312	305	318
1st	321	316	356	311	349

TABLE VI. ALPHA TEST SCORES
(Decile Ranks for Scores of Defense Trainees)

Percentile rank	*Machine-tool operators N=20*	*Electrical repairmen N=12*	*All trainees N=61*
10th	149.5	100.5	150
9th	142.8	88.5	134
8th	136.2	76.5	119
7th	129.5	54.5	102
6th	114.5	36.5	89
5th	106.2	30.5	78
4th	89.5	26.5	61
3rd	82.8	22.5	51
2nd	59.5	17.5	40
1st	49.5	11.5	23

TABLE VII. TWEEZER DEXTERITY TEST SCORES (SECONDS)
(Percentile Ranks for Scores of Defense Trainees)

Percentile rank	*Machine molders N=30*	*All trainees N=55*
10th	350	300
9th	387	387
8th	433	427
7th	462	458
6th	481	478
5th	500	499
4th	521	528
3rd	542	565
2nd	583	633
1st	675	737

many occupational surveys has shown that too high intelligence or even mechanical intelligence is a definite drawback to success in an occupation that does not fully utilize such intelligence. Welding is a more repetitive operation than is the work of a skilled machinist, and a brilliant man might very soon become bored with welding, despite the premium wages now also current in the occupation. A little more attention to these average scores to be required of prospective trainees for various courses might very well do much to cut down the number of dropouts which result from such maladjustment.

Interpreting the Test Scores

One further illustration of this point might be worth while. A man applies to the supervisor for enrollment in the shipfitter-helper course. He expresses his interest, he has good appearance, appears earnest; and is signed up for the six-week, intensive course. However, when he is well into his first week he begins to see that he cannot read fast enough to master the informational material; the arithmetic necessary for the simple blueprint reading requires more interest and attention than he likes to give to that. Furthermore it turns out that he is clumsy with shears, and since he doesn't get much time at the welding there just isn't much to interest him and take away his feelings of frustration. About this time the delivery man for a local bakery or something is called to the army, and this job which pays better than his last one appeals to him. So he drops out. This hypothetical case is not at all exaggerated, and could be cited and multiplied time and again. If, when he applies for the shipfitter course, he is given several tests so that he might be even roughly classified as to ability by reference to the norm tables to follow, it might have been observed that his intelligence was not quick in terms of the test norms; his mechanical experience is negligible (this can be readily determined with the O'Rourke test); and his eye-hand co-ordination are somewhat below average (from the Spatial Relations Test or Finger Dexterity). Since he is earnest he should not be turned away, but probably should be encouraged to enroll for a less intensive course, such as for electrical repair work, or welding, or even mechanics. In this manner he might achieve more satisfaction at his own progress and stick with the course until he has mastered something worth while, even though it may not be what he originally thought he wanted. This illustration is given hypothetically in order to show that these records of test scores are tables of local experience, representing the facts of the case regarding the abilities required for each kind of class.

Conclusion

In this article we have attempted to show the comparative usefulness of several available tests in their application to some of our new areas of mechanical testing and placement. It would be easy to go into a discussion of the statistical relationships of these tests with a criterion of success or with each other. However, for the relatively uninitiated person wishing to make application of aptitude tests in situations similar to those cited here these experiences should provide a helpful pattern. It has been kept in mind that the determination of critical score points might yield more immediately useful results. Until such points can be determined for a given local situation those presented here should be of some assistance. Similarly the decile blanks for trainees for various mechanical operations may well serve until local norms have been established through local testing experience.

THE IMPORTANCE OF SHOP TRAINING IN GENERAL EDUCATION

Reference: Report of the Harvard Committee, *General Education in a Free Society.* Cambridge, Mass., Harvard University Press, 1945, 267 pp., $2.

Page 160. ". . . we shall say something about the importance of shop training in general education. For those who intend to go into scientific or technological work, it has special relevance. The manipulation of objects, the use of tools, and the construction of simple apparatus all are required for entry into the world of experimentation. Even the pure mathematician is greatly aided by shop experience; the forms, contours, and interrelations of three-dimensional objects provide a stimulus and satisfaction not to be achieved altogether within the limits of plane diagrams. The lack of shop training is at present a most serious deterrent to entry into all types of technological work and to college and post-graduate training in science, medicine, and engineering. What students should learn in secondary school specifically is the use of simple hand tools and the execution of simple basic operations such as soldering and elementary glass blowing and joining. If the student can be taught to operate a drill press, a wood lathe and a machine lathe, so much the better."

Page 175. "In an earlier section we spoke of the importance of shop training for students who intend to go into scientific or technological work. Such experience is important for the general education of all. Most students who expect to go to college are now offered an almost wholly verbal type of preparatory training, while hand training and the direct manipulation of objects are mainly reserved for the vocational fields. This is a serious mistake. The bookish student needs to know how to do things and to make things as much as those students who do not plan to make further intellectual training. The direct contact with materials, the manipulation of simple tools, the capacity to create by hand from a concept of the mind — all these are indispensable aspects of the general education of everyone." — *John R. Ludington.*

The National Board of Fire Underwriters estimates that during 1944 over $400,000,000 went up in flames. — *Safety News.*

Determining Future Vocational-Educational Needs

*Earl M. Bowler**

Possibly, at no time since the passage of the Smith-Hughes Act has there been a moment more propitious than the present for determining future vocational educational needs. Completion of certain phases of our war-training programs has left some communities with usable equipment that fits very well into a proposed or operating long-range vocational plan of activity. On the other hand, there is the occasional community about as well blessed with what has survived the "war-training storm" as they would be, had flood waters suddenly receded, leaving their dubious blessing of residual matter.

Contrasted with a given community's ability to put to use wisely all equipment it may have is the silver lining which spotlights the known ability of a state to absorb equipment and put it to good use in areas where there exists evidence of its need. Vocational training based upon well-defined community need brings quick, twofold, desirable end results:

1. Training objectives may be narrowed considerably, thereby eliminating the undesirable results of shotgun programs.

2. Better utilization could be made of existing equipment, thereby eliminating training for equipment's sake.

While little has been written on the subject, there seems to be reason for hope that the long awaited increase in continuing vocational aids may soon become a reality. If this be true, then the desirability of rediscovering bona fide needs, and the re-emphasizing of such programs as have proved to be meritorious, was never greater.

The standardization of occupational titles by the War Manpower Commission and the further development of job descriptions in recent years outmodes earlier vocational education surveys. On the other hand, a survey made today incorporating into it this new and vital information, will be of much greater significance than even before. If modern surveying techniques are employed and current occupational information available through the United States Employment Service is incorporated into these surveys and studies, the end results should be satisfying and invaluable to labor, management, and educators alike.

Industry has much to contribute toward the success of any community survey. Vocational educators have called upon management frequently when setting up programs. There is a need to go to the businessman and the plant manager when a re-examination is being made of an existing program. When courses are found to be on sound footing after being surveyed, they might well be re-emphasized in one or all of the following ways:

1. Equipment could be adjusted to meet better the area needs shown in the findings of the survey.

2. Course content should be changed to adapt it more completely to community needs.

3. The instructor may be urged to take some refresher work to bring him up to date with industry.

4. Entrance requirements may need adjusting to insure a "placeable" end product.

5. Performance standards may have to be raised to improve and insure placement possibilities.

6. The school shop situation may have to be rearranged to reflect more nearly the realities of business or industry.

7. Training might well be more closely *tied into* the existing placement facilities of the United States Employment Service.

Jointly then, state, community, school, and industry should determine whether what is being done is in order. Likewise, they should determine what needs to be done to put the training situation in order. Techniques for doing this job should be standardized on a state level so that comparable results may be tabulated and used state wide. Any surveys attempted should be kept moving forward through the combined co-operative effort of those interested in its outcome.

Because what will work in one situation will not always work in another, definite area minimums should be established. Common elements which might be included in a worth-while plan of procedure include the following:

Purpose of the Survey

The expansion into new fields or the continuation in old should be based upon well-defined needs. These needs can best be discovered through a survey conducted jointly by state and local vocational educators in co-operation with local industries and business houses. Since this study provides a basis for future action, a survey that is not followed by needed corrective measures fails in its purpose.

Objectives to Be Met

(Here, clear, well-defined objectives must be formulated and stated. These objectives should not be mistaken for the conclusions which should be prepared from a critical examination of the data revealed by the survey. Several objectives that might well be considered are suggested at this point by way of illustration, only.)

The Survey Should:

1. Make possible the selection of a committee that will assist local school people:

a) In determining the scope of the undertaking.

b) In selecting the items to be included when gathering data.

c) In securing the co-operation of management and labor in the area.

d) In *ferreting out* sources of information of value in the study.

e) In suggesting the kind and amount of publicity to be given the project.

f) In bringing about prompt action which will harmonize defined needs and the school offering.

2. Provide a medium for co-operative action between vocational educators and management, labor, associations, organizations, enterprises and agencies.

3. Provide sufficient valid factual information to permit the adjustment, expansion, or establishment of well-defined training programs.

4. Make provisions for action which will better gear the school program to the needs of the community. (This is important because too many surveys are made and promptly forgotten. If machinery is not set up to transmit the findings into action, more often than not, the survey might well be abandoned before it is started. There is no value in surveying for the sake of surveying. The value of the survey becomes apparent when the findings are transmitted into action.)

Technique Involved

(These apply where an area survey is part of an over-all state program.)

I. A procedure should be devised which spells out rather accurately each step in the survey. This will give greater objectivity to the study and should insure a basic minimum of data. Community or area data may later be incorporated into a consolidated plan of expansion for the state.

II. The spelled out procedure should include the following minimums:

1. A state department of Vocational Education worker trained in survey technique should assist local school officials in making the study.

2. Where ground work reveals the feasibility of such a plan, a general meeting should be called. Representatives of management and labor should be present. At this meeting, objectives of the proposed study should be carefully explained. When the meeting has been properly planned and the explaining carefully done, good will and co-operation should be the natural outcome.

3. An *information committee* should be named by the assembled group. School officials should exercise leadership in making these appointments. This *working* committee should assist with the survey, act as liaison between the school officials and the public, and disseminate information concerning the progress of the work and the significant findings.

*Dallas, Tex.

4. The working committee should assist in formulating a questionnaire that gets at information needed locally and on a state level.

5. When devised, the questionnaire should include:

a) The number and type of job openings occurring annually.

b) Information that will aid school officials in determining the kind and amount of upgrading training needed by workers presently on the job in the community.

c) Information that will aid school officials in determining the kind and amount of upgrading training needed by workers presently on the job in the community.

d) The educational level of attainment required of those employed.

e) Personality traits and other relevant data specified by potential employers.

f) The location and number of potential work stations in local industries and business houses.

g) Data that will aid in state-wide program planning.

h) Other pertinent data.

III. After the community surveys have been completed, state-wide *spot* maps should be prepared showing the following:

1. Present programs operating in the state.

2. Immediate future expansion based upon need as revealed by the survey.

3. Secondary expansion after immediate needs are met.

IV. Graphic aids of various kinds should be considered carefully and as much data as possible presented in this form. The written material in the survey should be kept as brief as possible. Conclusions and recommendations should be briefed and spelled out clearly and concisely.

V. Whatever action is necessary should be taken to bring into harmony community or area needs and state potentialities. Needs, objectively determined, should be satisfied wherever possible with promptitude. The utility and effectiveness of the survey deteriorates rapidly with nonuse or misapplication.

Conclusions

Conclusions should be clearly and concisely drawn. It is well to separate them from any descriptive body material.

Graphic presentation should be given careful consideration and spot maps should form the basis for the consideration of future expansion.

Some Anterior Considerations

I. Objectivity is highly desirable in any survey undertaking. Outside help is available in most communities for the asking. Agencies or groups that have personnel qualified to assist in some phase of the survey include:

1. United States Employment Service
2. The War Manpower Commission
3. Organized Labor
4. Chambers of Commerce
5. The United States Office of Education
6. Apprentice Training Service
7. National Association of Commerce
8. Local Service Clubs
9. Foremen's Clubs
10. Trade Associations and others.

II. Expansion into localities where in the judgment of local business people *no potential demand* exists should be kept to a minimum. Surveys should reveal the community thinking on these matters.

III. Pressure groups frequently become overenthusiastic about programs. Maps such as have been mentioned above should permit only orderly expansion based upon need alone.

IV. Co-operation may be lacking in certain communities but the *potential trainee load* may be such that training leading to placement outside the community is desirable. State and local vocational people should pass judgment on these matters after surveys have revealed significant supporting data for a given community.

V. Carefully planned and well-organized survey techniques should be considered as an *acceptance medium* in communities where used. If a *potential demand* for a program shows up as a result of the survey, the community should be solidly behind the program as a result of their having gained firsthand information from participating in the survey. The community should become aware of the potential demand along with those making the survey. This can be best done through the *information committee*.

VI. In so far as possible, the broader base that is afforded through area planning and operations should be given consideration when the survey is attempted.

Survey techniques and their correlated tools have improved over the years. It is not possible to review and evaluate all methods of surveying within the limits of a single magazine article. Some significantly modern techniques have been suggested, however.

Important changes in the long-range vocational program seem to be in the making. Plans for local, area, and state-wide surveys should be projected to take advantage of favorable timing in determining future vocational educational needs.

Translating a Philosophy Into Practice

*H. A. Jones**

When a class is ready to begin a new unit in industrial-arts work in a general shop, it is well for the instructor to exhibit a few, well-made, properly finished projects, which satisfy the basic operations of the unit. In addition he ought to spread out the visual aids, consisting of photographs, printed diagrams from magazines, blueprints or mimeographed drawings, showing different projects which would satisfy boys with varied interests and at the same time fulfill the objectives of the unit. The main purpose of this introduction to the unit is to stimulate the creative urge of each individual pupil. It will be necessary after this lesson is over to allow the pupils time to think about their project while they are out of school, because pupils are different and will naturally follow their own particular interests, many of which are centered in the home.

Figure 1 shows some designs used as a visual aid in project planning. Such visual aid material may be kept in a special cabinet, similar to the one shown in Figure 2.

On the students' next visit to the industrial-arts department, the teacher should expect some form of response on the part of each pupil. An *A* type pupil, for example, will bring a sketch of the project he wishes to make. He receives an *A* rating on his planning because he has ignored the temptation to copy the projects presented in the motivation lesson and has determinedly made up his mind to plan his own project to satisfy his own particular needs. Figure 3 shows the response of an *A* type pupil.

The *B* type pupil will select a project from the motivation material which satisfies his needs, but he will make some changes in it, either in form, function, or size. Because of this individual effort, he is given a *B* rating for planning.

The *C* type pupil selects a project from the motivation material and copies the given drawing. Because of this lack of initiative, he is given a *C* rating for planning.

The *D* type pupil needs more assistance than any one of the others. In addition to copying the given drawing, he should be provided with a job sheet showing carefully planned, step-by-step procedure. Because he needs so much help and shows so little initiative, he is given a *D* rating.

In the execution of his work the pupil takes the following steps: (1) Purposing, (2) planning, (3) executing, (4) judging or evaluating.

*Inspector, Department of Education, Victoria, B.C., Canada.

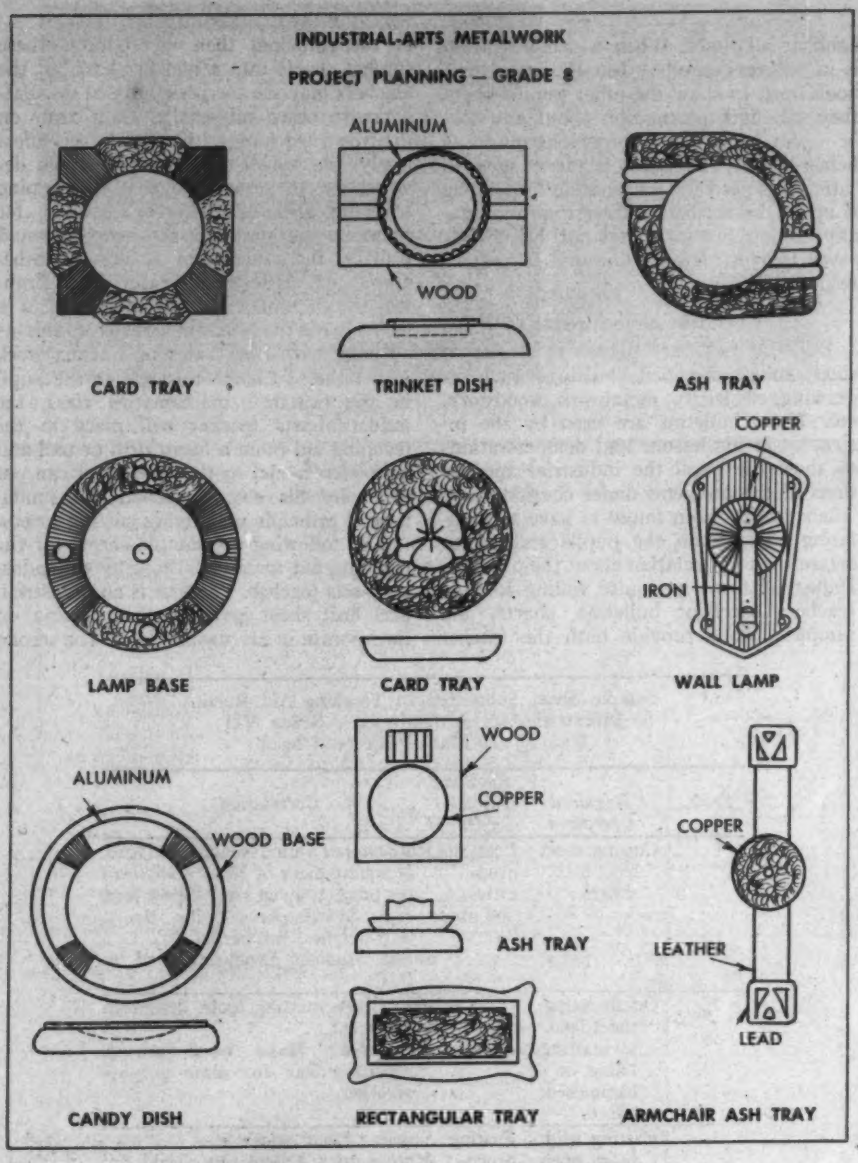

Fig. 1. Designs used in project planning

For their purposing and planning, the pupils can receive the following marks according to their type response: A equals 10; B equals 6; C equals 4; D equals 0.

By comparing the crude sketches of projects brought in by pupils to the drawings used in the visual aids, pupils can readily see the need for knowledge of working drawings and ability in making them. The teacher should, therefore, now give a lesson in drawing, not as an isolated lesson, but integrated with the practical problem of producing a working drawing for the practical unit involved in shop work.

Drawing

The drawing course is integrated with the needs of the general shop, offering exploratory work in metalwork, woodwork, and electricity. Abstract problems are avoided as much as possible. The geometrical problems presented are linked directly with the solving of problems needed in making the drawings required for the working out of projects. In making working drawings there will be different types of pupil response: some boys will only learn to read drawings; others, to make copies of selected projects from the visual aids; and others will prepare sketches of their own ideas for projects, which satisfy the fundamentals of the unit, and will work out their own details and make completed drawings.

When the pupil has finished his assignment, he goes to the teacher, who indicates on the drawing any imperfections or incorrect methods used. The pupil then proceeds to the drawing data scale, shown in Figure 4, and observes the correct method of applying that particular drafting fundamental. For example: a teacher's notation *C6* directs the pupil to Sheet C Item 6, to read and observe that dimension lines should be spaced equal distances from the outline and from each other, as shown in the illustration on the drawing data scale. The pupil then erases his mistake and corrects it according to the example shown on the data scale.

Fig. 2. A cabinet for housing visual aid materials

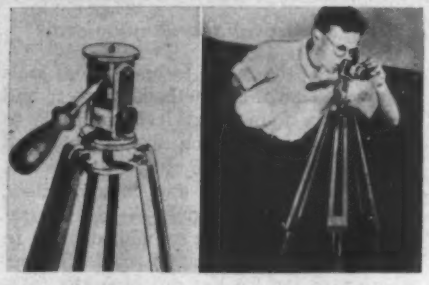

Fig. 3. Project made by an A type student

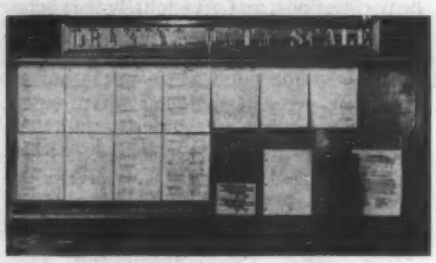

Fig. 4. Drawing data scale

After all corrections have been made, the pupil goes to the drawing evaluation scale, shown in Figure 5, and matches his completed drawing assignment with those of other pupils, graded from good to bad. From this chart the pupil determines his own rating, and then takes the drawing to his teacher for a final rating. In this way the pupil takes full responsibility for his own correction and evaluation, and the teacher acts as a sympathetic guide.

Over a period of two years it has been found that this system has improved the drawing standards to a greater degree than any other system so far tried, and it encourages the pupils to think individually and to work with initiative.

Only some of the more important drafting fundamentals are given as drawing assignments. In some cases pupils produce the working sketch and then make a full-sized layout on a board or on a large sheet of brown paper. But no pupil is allowed to cut out material until his plans are complete and thoroughly checked by the instructor.

Demonstration

The pupil is not allowed to start a new basic operation until he has witnessed a good demonstration. The instructor should be careful to present any new operations

Fig. 5. Drawing evaluation scale

in a very thorough fashion. His tools should be sharp, his methods correct; and it has been found that it is desirable to give this demonstration first slowly and then with some speed, then to allow the class to ask questions; and, in some cases, to have one boy take over the demonstration to see how he has responded to it. In this way the instructor can discover whether or not he has put over the techniques he intended. It will also be found necessary from time to time to give recall demonstrations, and occasionally it is beneficial to have operation sheets prepared so that the step-by-step procedures can be recalled by the pupil as he works out an operation. We have found that expert craftsmen, who are orderly in their methods and are very particular in their standards of work, naturally expect and get similar response from their pupils; whereas, careless demonstrations invite careless work from the students.

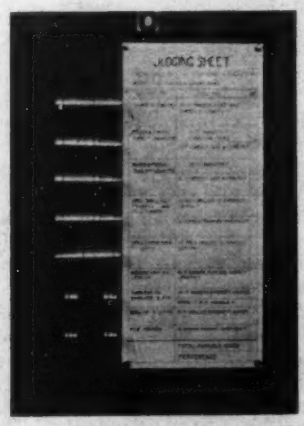

Fig. 6. Judging board for practical work

The evaluation of practical work can be carried out in a similar fashion to the evaluation of drawing. Figure 6 shows a judging board for practical work. Some instructors have found that by placing with the practical work produced by the boys some product of industry, that has the same basic operation, that the comparison is beneficial to all.

Textbooks

The pupil is encouraged to use his textbook at all times. When a demonstration is in progress, one boy usually has a textbook open to show the other pupils where they can find information about any tool or operation while the demonstration is being made. The pupil is encouraged to satisfy his need for information by looking it up in the textbook rather than continually asking his instructor for help. This saves the instructor's time and places the responsibility on the pupil.

Use of Industrial Bulletins

Bulletin racks are placed in a general shop under classified headings such as drawing, electricity, metalwork, woodwork, etc. These bulletins are used by the instructor in his lessons and demonstrations to show the pupil the industrial applications of the problems under consideration. Their use has been found to have a stimulating effect upon the pupils and to increase their information about the problem. Industrial firms are quite willing to send teachers excellent bulletins, charts, and samples, which provide both the teacher and pupils with splendid material for the fuller development of the pupil's interest and growth.

Correlation

In a well-organized school, each subject teacher should make out his course of work by units in proper sequence, and adjacent to each problem he should state briefly any possible correlations that may be practical. If the principal then incorporates these subject charts into a master chart, all the teachers may see the possibility of correlating with other subjects as they carry on their own teaching duties. To do this effectively, the school should have a room devoted to an orderly system of keeping teaching aids for subject teachers; for example, the industrial-arts teacher would provide the teacher of practical mathematics, who is ready to deal with the problem of circumference and diameter of a circle, with problems in cutting speeds as applied to drilling holes or turning work in a lathe. To make this real to the pupil in the practical mathematics class, the industrial-arts teacher will place in the teaching aid room a burnt drill or tool and a wooden model so that the pupil can observe by his own operation the fundamental principle underlying cutting speeds.

The following are sample sheets for the teaching aid room submitted by the industrial-arts teacher. The first is an industrial-arts unit sheet given to the principal to incorporate in his master chart. The second shows how a basic operation in industrial arts can be correlated with other subjects. The third contains problems for the practical mathematics teacher.

Sample Sheet Submitted to Teaching Aid Room.
Industrial Arts — Metalwork — Grade VII
Unit I: To Make Projects of Lead

Prob.	*Required Operation*	*Related Knowledge*	*Correlation*
1	Cutting sheet lead with shears	Lead, its properties and uses	*Mathematics:* Find weight and cost of square piece of No. 2 sheet lead for project, given size. (Sheet lead costs $13.20 per 100 lbs. No. 2 lead weighs 2 lbs. per sq. ft.) *Social Studies:* Producing lead in B. C.
2	Ornamenting sheet lead by matting, lining, or hammered effects		*Art:* Given matting tools, design an ornament. *Woodwork:* Make wood project requiring lead for some purpose or other.
3	Casting lead in an open mold	Casting procedure	*Science:* Lead oxide. *Mathematics:* Calculating weight and cost of simple lead casting. (Pig lead costs $8.10 per 100 lbs.) *Art:* Design for casting. *Woodwork:* Making a wooden mold for lead castings.
4	Hammering out lead		*Science:* Malleable metals. *Social Studies:* Use of lead through the ages.
5	Piercing lead		*Art:* Making a design for piercing.
6	Casting lead in a closed mold	Foundry casting	*Science:* Contraction of metals. *Social Studies:* Casting and human progress. *English:* Description of project. Vocabulary. *Guidance:* Industrial bulletins. Occupations using lead. *Health:* Lead poisoning. Safety in handling molten lead.

An Integrated Problem
Industrial Arts — Industry — Physics
and
Practical Mathematics

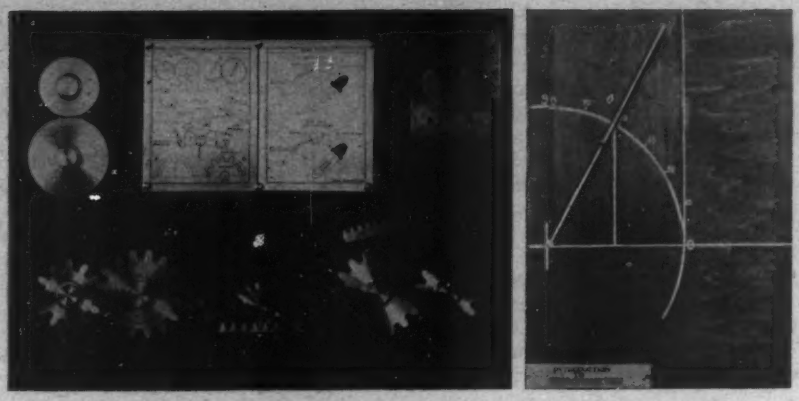

Fig. 7. Correlation between industrial arts and mathematics

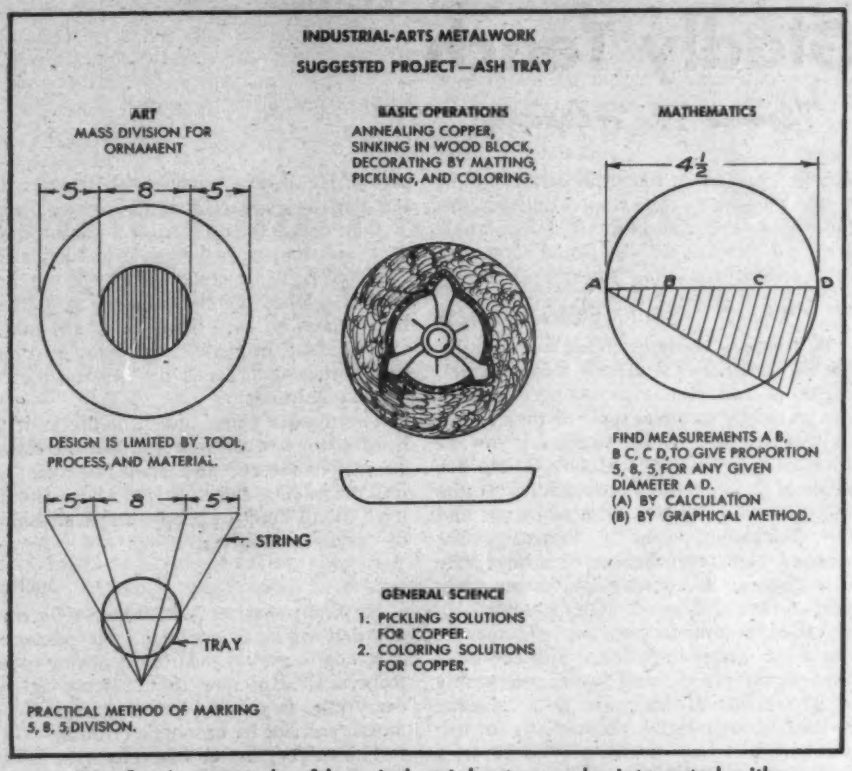
INDUSTRIAL-ARTS METALWORK
SUGGESTED PROJECT—ASH TRAY
ART
MASS DIVISION FOR ORNAMENT
5 8 5
DESIGN IS LIMITED BY TOOL, PROCESS, AND MATERIAL.
5 8 5
STRING
TRAY
PRACTICAL METHOD OF MARKING 5, 8, 5 DIVISION.
BASIC OPERATIONS
ANNEALING COPPER, SINKING IN WOOD BLOCK, DECORATING BY MATTING, PICKLING, AND COLORING.
GENERAL SCIENCE
1. PICKLING SOLUTIONS FOR COPPER.
2. COLORING SOLUTIONS FOR COPPER.
MATHEMATICS
4½
A B C D
FIND MEASUREMENTS A B, B C, C D, TO GIVE PROPORTION 5, 8, 5, FOR ANY GIVEN DIAMETER A D.
(A) BY CALCULATION
(B) BY GRAPHICAL METHOD.

Fig. 8. An example of how industrial arts may be integrated with other subjects

THE SITUATION: You are drilling a hole in metal and the drill burns and does not cut

THE PROBLEM: Find the correct r.p.m. (revolutions per minute) so that the drill will cut without burning.

REASONS FOR SOLVING THE PROBLEM:

(*a*) To save time in drilling.
(*b*) To prevent ruining the drill.

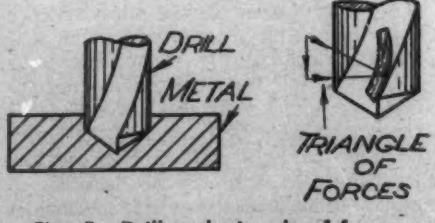

Fig. 9. Drill and triangle of forces

INVESTIGATION:

Question: Why does the drill get hot?
Answer: Because of the friction (Physics) which is dependent on pressure. See Figure 9.
Question: How can friction (and heat) be reduced?
Answer: By using a cutting lubricant.
Why?: To reduce chip pressure friction by providing lubrication (Physics) for chip as it passes over the tool and by the cooling or refrigerating action of the coolant.
Question: What is the diameter of the drill?
Answer: Measure it, or look for stamped size on shank.
Question: What should be the cutting speed in f.p.m. (feet per minute)?
Answer: Look up recommended table of cutting speeds. An industrial handbook suggests 30 f.p.m.

SOLUTION: $C.S. = \frac{\text{cir.} \times \text{r.p.m.}}{12}$ (Found by observation and experiment with model.)

$$C.S. = \frac{\pi D \times \text{r.p.m.}}{12}$$

$$\text{or r.p.m.} = \frac{C.S. \times 12}{\pi D}$$

SUBSTITUTE: $\text{R.p.m.} = \frac{30 \times 12}{22/7 \times \frac{3}{4}''} =$

$$\underline{\text{R.p.m.} = 152.}$$

APPLICATION: Set machine to run at 152 r.p.m. or nearest lower available speed and observe that the drill will cut without burning.

TEACHING AIDS:

1. A drill that has been burned at the cutting edge.
2. A wooden cylinder to represent a drill.
3. A drilled piece of metal and drill chips.
4. An industrial table of correct cutting speeds.

In English, for example, the pupil should be asked to correlate with the industrial arts to complete a cycle of creative thinking, which he has been motivated to carry out in the industrial-arts department. First, by having a purpose; second, by visualizing a project which he is given to make; third, by planning that project in the form of a drawing; fourth, by making the project in three dimensions; and fifth, by writing a description of it for his English correlation. This completes the cycle of creative thought:

A. The Idea.
B. The shorthand expression in the form of a diagram or drawing.
C. The description in the form of words.
D. The actual project in the three-dimension form.

One pupil in the English class may sketch any object, pass the sketch on to another pupil to write a description of it, who then passes the description on to pupil No. 3 to sketch the object therein described. In this way careful expression can be checked automatically by the pupil's individual response, and an industrial vocabulary is gradually built up. This assignment is self-checking.

The social studies teacher will find a wealth of information in the industrial-arts field, which will vitalize his teaching and broaden the pupils' ideas on modern industrial life. This can be carried out chiefly by the use of industrial bulletins and charts, provided by the many industries who have shown great willingness in sending this excellent material to our schools.

It has been found that many pupils can work out problems in mathematics on a purely memory basis without having any established concepts of the principles of mathematics involved. By proper correlation and careful presentation with the right teaching aids, the pupil will make his own

observations and build his own concepts, from which he can develop his own formulas, and apply them to any problem of that particular unit without having to depend entirely on memory for it. This type of quantitative thinking is beneficial to the pupil's mental growth and has a stimulating effect upon his outlook in the subject that he may be studying.

This same principle applies in all other subjects. The art room, for example, should not be a place for an exhibition of paper art, but rather an exhibition of art as expressed in various media which will satisfy his needs in any subject while a tudes and interests.

Subject Teachers

With a plan of subject correlation and with proper integration in the school, and with provisions made for visual aids and other teaching aids for all subjects, teachers will soon discover that they are not teaching an individual, isolated subject, but are all assisting in the general growth and development of the child. When the opportunity offers, they may be called upon to follow up a pupil's question and satisfy his needs in any subject while a particular lesson is being given in any one of the subjects. In other words, the industrial-arts teacher will teach not only industrial arts, but he will assist very definitely in satisfying the pupil's needs in English, science, mathematics, social studies, art, and the like, so that the pupil himself does not feel that his education is a matter of fixed compartments. The student will be happier in school when he feels a satisfaction and a conscious growth, which is pleasant and wholesome to his all-round development, no matter in what department he may be placed; and, when his school days are over, he will go into the world as an integrated personality, vibrant and functioning smoothly, to solve the problems of the kind of world in which he may finally find himself.

Gladly Teach

*Thomas A. Hippaka**

President Theodore Roosevelt rightfully placed a well-deserved premium upon the worth of the teacher when he said, "You teachers — and it is a mere truism to say this — you teachers make the whole world your debtor; and of you it can be said, as it can be said of no other profession save the profession of the ministers of the Gospel themselves, if you teachers did not do your work well, this Republic would not outlast the span of a generation."

G. Stanley Hall substantiates the importance of education, and the work of the teacher, when he reminds us that, "Education has now become the chief problem of the world, its one holy cause. The nations that see this will survive, and those that fail to do so will slowly perish. . . . There must be re-education of the will and of the heart as well as of the intellect, and the ideals of service must supplant those of selfishness and greed."[1]

Knowledge for Peace

In the attainment of world peace, and that must be the primary concern of everyone, especially of us who teach, Mrs. August Belmont has made us both proud and glad to be teachers when she writes: "If a sufficient number of thinking men and women are armed with knowledge and enlightenment as to the foundations of a lasting peace, they will be in a position to demand of their leaders, and of their Governments, the fulfillment of the magnificent opportunity."

These statements constitute both a challenge and an incentive, that we may gladly teach in a world fraught with danger, but which is also one full of opportunity for us who would improve the lot of mankind. Teaching can, therefore, be an exciting experience, and a romantic adventure in a world where the responsibilities are numerous, and the ultimate satisfactions great for those of us who would serve and even dream of a better world to come.

Driving Forces

If we are to enjoy teaching, we naturally need to possess vital driving forces as well as skills and standards of performance. Let us briefly examine some of these.

First of all, in the words of Joy E. Morgan, "A teacher is a believer. He has abiding faith in the improvability of the race." With a healthy sense of humor and an undeniable faith in humanity the teacher might even believe of a boy: "He is a piece of skin stretched over an appetite. A noise, covered with smudges. He is called a tornado because he comes at the most unexpected times, hits the most unexpected places, and leaves everything a wreck behind him. He is a growing animal of superlative promise, to be fed, watered, and kept warm, a joy forever, a periodic nuisance, the problem of our times, the hope of a nation. Every boy is evidence that God is not yet discouraged of man."[2]

A master teacher is guidance minded and mental health minded, teaching pupils, and not subjects. He knows his specific field well, and its setting is a broad background of understanding and scholarship, enriched by timely research. He recognizes and provides for individual differences. He knows that one of the fundamental human cravings is success. Added to success are the all-powerful drives of approval, sense of belonging, security, adventure, and hunger. He wisely utilizes these as interpreters of human behavior and motivators of learning. He pursues the project method where learning comes through problem solving, for he knows that knowledge is best retained when learned through application. He always teaches with transfer of learning in mind. His total interest in a student characterizes that of a parent, and he knows that when he has succeeded with the child he has succeeded with the parent. Likewise, when the child fails he fails with him. His is an inquisitive mind, the mind of a student, ever alert, and ever learning and preparing. This is his best insurance against staleness.

The teacher brings much of life as it is lived in the workaday world into the classroom, laboratory, and shop, because he has made it a point to be where life is lived by all kinds of people under all kinds of varying conditions.

Justice

He gladly teaches right from wrong, and not that which is expedient. He possesses a strong sense of justice, believing with Robert M. Hutchins that, "Every act of every man is a moral act, to be tested by moral, and not by economic criteria."

The teacher is free of prejudices, for he knows that we are not going to be able to live happily with people of other races and religions if we do not practice tolerance and teach others to do likewise.

He teaches people to think upon the basis of factual evidence, and because of this, with Thomas Carlyle he knows that, "A thinking man is the worst enemy the 'Prince of Darkness' can have."

The teacher respects and reveres human personality as it unfolds itself. He is ever mindful that his personality should radiate health and energy, intelligence, character, emotional stability, and social adjustability.

A strong teacher has the self-confidence that tingles with generosity, and the self-respect which usually stems from self-confidence and from obligations substantially met. He gains the respect of his charges by being firm, but fair. Authority he uses sparingly, with intelligence and judgment. Responsibility he delegates as rapidly as his students are able to shoulder it.

*Iowa State College, Ames, Iowa.

[1]Since Pearl Harbor 200,000 teachers have left the profession; 50,000 emergency teaching certificates were issued in a single year, 1943–1944; while the enrollment in our teacher's colleges has decreased 60 per cent.

[2]*The Rotarian*, May, 1945. This description of the male adolescent is modern folklore — at least, no one person is known to be the author. It has come in through Boy Scout Executive A. P. Patterson, a member of the West Palm Beach, Fla., Rotary Club. — *Editors.*

Nobility of Work

He teaches young people the nobility of work, from the most menial to the high. Like Carlyle, he believes that "The glory of a workman, still more a master-workman, that he does his work well, ought to be his most precious possession: like the honor of a soldier, dearer to him than life."

He believes that the Christian religion is the greatest single influence for good in this world, and he reflects it in his every-day living.

The wise teacher does everything in his power to bring to fruition the prayer of the late Glen Frank when he prayed, "Give us reverence for our material that we may master the facts of our particular field, but help us to see that all facts are dead until they are related to the rest of knowledge and the rest of life."

He would believe with Edward Spenser that, "Education is the preparation for complete living." Every individual who comes to him is a social, intellectual, physical, emotional, and spiritual being, and that the whole child comes to school.

Faith

Above all, he has faith — faith in God, his country, and himself; faith that good will ultimately prevail. He concurs with Reverend Harry Emerson Fosdick when he says of faith: "Believe me, we are going to need faith in these days ahead. I, at least, am being no optimist about the future. We are not going to pass from this debauch of a world-wide violence and hate to a peace conference that will issue in a nicely ordered world patterned after our dreams. Any decency we get will be hard won and long worked for, the obstacles immense and the discouragements dismaying. It will take men and women of undiscourageable faith to see the next generation through — not sweet faith that says because life is so lovely there must be a God, but faith that has looked into the hell of life, what Carlyle once called 'the everlasting nay' of a godless world, and in revolt against it has risen up with 'the everlasting yea' of a convinced belief in God and the soul."

And finally, he who gladly teaches, believes with Dr. Charles A. Beard who writes: "As I look over the grand drama of history I find (or seem to find) amid the apparent chaos and tragedy, evidence of law and plan an immense achievement of the human spirit in spite of disasters. I am convinced that the world is not merely a bog in which men and women trample themselves in the mire and die. Something magnificent is taking place here amid the cruelties and tragedies, and the supreme challenge to intelligence is that of making the noblest and best in our curious heritage prevail."

Basic Information for the Co-ordinator of Diversified Occupational Programs

Murray Banks and William G. Slattery***

During the last few years there has been a phenomenal growth of diversified co-operative training programs, and according to present indications this particular form of vocational education will continue to develop. In order to gain the proper background of appreciation for diversified occupational training programs offered on a co-operative basis, it might be well to trace briefly how this movement had its inception, and the reasons for its swift growth, and present status in vocational education.

The first of the series of Federal vocational education acts was approved February 23, 1917. This act which was termed the National Vocational Education Act is more commonly known as the Smith-Hughes Act. It was the outgrowth of the demand by far-sighted business leaders and educators alike for a federally-supported plan to provide vocational education in the public schools and equal educational opportunity to all who desired to become skilled, intelligent workers and self-supporting citizens. It was the hope of the proponents of the act that a co-operative program would bring industry and school in closer co-operation, and fit the individual for useful employment. Viewed in its present-day light it has far exceeded the fondest hopes of the early leaders. Its beginnings were humble and development was slow in the early years. Adequate teaching personnel was difficult to obtain; many public school authorities were skeptical and showed no marked enthusiasm. The Federal Board for Vocational Education was still in an experimental stage. Its chief weakness was in not having adequate personnel to successfully initiate and administer the program. But in spite of all these early obstacles, the seed once planted grew rapidly. Today diversified co-operative training programs are firmly established in thousands of high schools throughout the nation. They have filled and are continuing to fill wartime needs of many industries.

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**Co-ordinator of Distributive Education, High School, Charlotte, N. C.

What the Program Is About

The diversified co-operative training program is a definite and well organized plan of training for students in the last two years of high school. A reputable training agency is selected and the employer co-operates by allowing the boy or girl to work one-half day and spend the minimum required hours in school. As a rule the trade or occupation which the student enters for training should require two years to learn. The half-day spent in school is divided by requiring the student to spend two school periods in subjects related to the job in which he is employed.

The co-ordinator selects the students, analyzes the occupation and makes careful placement. He attempts in every instance to fit the student to the job. He works out a schedule with the employer so that the trainee will secure work experiences on the job. The student's progress on the job must be checked systematically and the related subjects in school supervised closely. The burden of responsibility should be shared with advisory committees composed of employers and employees. These committees aid in setting up suitable work and study schedules.

A part-time diversified co-operative training program is designed primarily to aid the boy or girl who plans to end his or her formal educational career upon graduation from high school. The school does its part by furnishing the technical instruction and the employer provides the student with work experiences under actual working conditions.

Establishing the Program

The first step after the recognition of a need for such a program by the school authorities is to make a survey of the local industrial and business establishments to determine the reaction of these institutions to such a type of training. This type of survey should show if a sufficient number of employers will participate and whether this number assures sufficient training agencies.

The program should be explained clearly to parents, civic clubs, P.T.A., and other groups who are concerned. The prospective student should be familiar with the purposes of such a program. The training program includes required studies in which full credit is given for the related subjects taken as well as credit for work in the selected occupation. Successful completion of the program assures the student of graduation.

Care should be taken in the selection of the classroom. It should be a combination of classroom and laboratory. Provision should be made for library facilities, filing cabinets, telephone and other necessary equipment to assure smooth functioning.

Finally, an occupationally competent co-ordinator is selected. This is usually done by the superintendent of schools who may act in conjunction with the state supervisor of industrial education.

The Advantages of the Diversified Co-operative Training Program[1]

Such a program offers a number of specific advantages to four important groups: The student, the school, the employer, and the community.

I. *To the Student*

1. Offers an opportunity for boys and girls in smaller communities to receive training formerly available only in large cities.
2. Helps in the choice of suitable occupations.
3. Provides training on real jobs under actual working conditions.
4. Students secure information related to occupations at the proper time.
5. Provides an opportunity for them to grow in a selected occupation.
6. Students learn a job while attending school.
7. Encourages some students who are not interested in straight academic work to remain in school.
8. Provides training in some job or occupation for those who can complete high school, but who cannot go to college.
9. Opportunity to enter and learn an occupation at an early age.
10. Opportunity to learn by doing on productive or commercial work.
11. Arouses student's interest that might lie dormant otherwise.
12. Student sees the need for organized vocational training.
13. Student secures a good course in vocational training.
14. Provides opportunity to receive individual instruction.
15. Provides for and develops new attitudes toward responsibilities.
16. Provides for firsthand information on a job as contrasted to an artificial situation.
17. Helps establish correct work habits.
18. Emphasizes necessity of co-operation with other workers.
19. Opens fields of employment to young workers.
20. Does not prevent college entrance on finishing school.

II. *To the School*

1. Offers a vocational program for schools in small towns and communities.
2. Keeps some boys and girls in school longer.
3. Broadens the high school curriculum.
4. Offers economy in plant equipment and operation.
5. Makes the business and industrial establishments of the city laboratories for training young people under school supervision.
6. Provides an excellent opportunity for preapprenticeship.
7. Provides an opportunity for the school to co-operate with business and industry.
8. Relieves overcrowded class conditions in other subjects.
9. Offers an opportunity to render a real service in guidance.
10. Provides an opportunity for the school to give functional subject matter.

III. *To the Employer*

1. Offers an opportunity to secure and train desired type of workers.
2. Reduces training costs.
3. The school teaches the necessary technical information.
4. Opportunity to obtain employees who understand proper employee and employer relationships.
5. Provides workers who are interested in learning a job.
6. Provides high school graduates as employees.
7. Provides employer with the privilege of changing any students if they prove to be unsatisfactory.
8. Provides an opportunity to expand business through better trained workers.
9. Furnishes more contented workers.
10. Trained workers are more likely to stay on the job.
11. Furnishes material for leaders in the industry.
12. An opportunity to select students for specific jobs.

IV. *To the Community*

1. Makes better and more useful citizens because of supervised and superior training at an early age.
2. People more content when properly trained for their work.
3. Students stay in school longer.
4. Fewer juvenile court problems.
5. Makes for better community leaders.

The Co-ordinator

The co-ordinator must have a rather unusual combination of qualifications. He must be a graduate of a standard college or university or its equivalent. It is necessary that he have some years' experience as a wage earner in two or more occupations or skilled trades. Some state plans require in addition, one year of employment in a single occupation or trade. The professional education required, varies with state plans. Successful completion of such courses as the philosophy of vocational education, making and using job analyses, development and organization of instructional material, methods of teaching problems in apprentice training and similar courses are recommended. The teaching experience of the co-ordinator also depends on the state plan. Most states require one year of successful teaching in the field of trade and industrial education. One of the qualifications which the co-ordinator as an individual must possess, is a real interest in young people. He must know the problems of the young worker. The co-ordinator should have a schedule so arranged that he is free to visit trainees at work. In this way he is always in a position to know the duties and the progress of the trainee. In periodic visits with the employer, educational needs are brought to the attention of the co-ordinator. Through contact with other teachers and by other means, he can arrange to meet these needs. Much of his work will be done outside of regular school hours for it is during this time that his pupils will be at work.

In addition, the co-ordinator has certain duties in relation to the public generally. It is up to him to create a clear understanding of the objectives of the program, to create and maintain active public support, keep the public informed on the progress of the students and to keep himself informed as to changing business and industrial trends. There are certain duties of the co-ordinator in relation to the student. Among these are maintaining student interest in the program of diversified occupations, seeing that students are properly placed and supervised while in training, and providing properly selected and related technical instructional material.

The Employer

The employer should understand clearly the working plan. The co-ordinator must be in a position to adjust all complaints promptly or to transfer or remove any student not fitted to the particular occupation in which he is engaged. He should set up a systematic plan of co-ordination with each employer.

Parents

Parents of trainees look to the co-ordinator to furnish the proper information about the program. It is essential that co-operative relations with parents be maintained. Any placement, adjustment or transfer of a student should be justified by the co-ordinator.

Operating Procedure

Entrance requirements of trainees. Many state plans require that those enrolled in a diversified occupations program be at least 16 years of age and must have completed at least two years of high school work. Full consent of the parents is usually required and both students and parents should understand that the major objective of the program is not one of earning a living while going to school. Courses in diversified occupations are open to students who have left the regular school and wish to return for this type of training.

Local Advisory Committee. One of the best known ways for getting co-operation and support for a job training program under public school supervision is to appoint advisory committees. In this manner the intelligent advice, interest, influence and support of the strongest and most influential people of the community are brought into service. The committee advises, counsels and promotes the general activities of the program. Representations of employers and employees, leaders of civic groups, and the school organization should be members. Usually the appointments to an advisory committee are made

(Please turn to page 448)

[1]Bulletin Number Sixteen, "A Manual for Coordinators," Arkansas State Board for Vocational Education, 1943.

Industrial Arts and Vocational Education
John J. Metz, Editor

YOUTHFUL VANDALISM

Halloween fun has been the excuse or pretext used by many boys and young men in order to make the pranks which they played recently seem less offensive. Some of these Halloween pranks, however, were far from being innocent, inoffensive types of fun. And Halloween is not the only time of the year when this destructive spirit is displayed.

Dumping garbage cans may strike the perpetrators as funny, but when they carry the cans away and throw them into other people's yards, they are also guilty of larceny.

When big pieces of lumber, stones, or concrete are deposited in the center of dark streets, or alleys, they become dangerous sources of grave accidents. When telegraph or light posts are pulled down, when fences are overturned, porch stairs ripped off, and similar pranks performed, the acts of vandalism can no longer be condoned as mere deeds of fun.

The police alone are not able to cope with this problem which is increasingly becoming worse. Parents also must do their share, because the duty of bringing up the young as honest, law-abiding citizens, is still a major parental obligation. The school, however, should also take an active part in making its students appreciate the serious possibilities that may arise out of the thoughtless pranks which they look upon merely as fun.

The school shop teacher is in a specially favored position to influence his students to avoid participation in all acts of vandalism. The students in his shop have learned something about materials, safety, and the cost of making repairs. He can make his presentation very direct and understandable, and his efforts may do much in reducing the wave of hoodlumism which, unfortunately, seems to be on the increase as an aftermath of the war.

THE DISCHARGED VETERANS

After listening to the complaints made by foremen and those who have to hire and direct labor that returning servicemen are real headaches when they get back into office and factory, it is heartening to hear the statement made by James I. Onarheim, employment manager of the Allis-Chalmers Manufacturing Company, Milwaukee, Wis. Mr. Onarheim said that his firm has already put over five hundred of the returned veterans to work, and out of these there were only five men who presented adjustment problems.

Evidently this employment manager and his assistants have done a good job in welcoming these men back to their work. Evidently, too, the foreman of the Allis-Chalmers plants have been instructed to help the returning veterans to fit back into the places from which they emerged to fight World War II.

Vocational education is confronted by a similar job of helping the men who have gone through the harrowing experiences of the terrific struggle in Europe or in the Pacific area, to again fit into the tempo of normal life. That some of these returned men cannot do this without grave effort is quite easily understood. They need help in many ways, and the adverse criticism often heaped upon them will not be of any assistance in helping them to make the proper adjustments.

Those of us who have to meet these men, and who must help them overcome physical and mental handicaps, may well ponder on the fact that these are not the same men who left us to join our armed forces. They may look to us as if they had not changed, but man cannot take what these men had to take, and not be changed in some way or other. They need sympathetic treatment. They have had a surfeit of the absolute obedience demanded by the army. They are free men once more and the realization of this may affect them like a heady wine. They must be led in an understanding way until they have again fitted themselves into normal human society.

The article, "You and the Ex-Serviceman," by John E. Crawford, which appeared in the last issue, was written for the foremen of one of our large industrial firms. Vocational teachers, however, will find that it contains many pertinent thoughts that will help them in understanding and assisting the veterans who may enter their classes. These ex-soldiers have done a great job. They have borne and suffered much. They deserve the best kind of treatment—let's give it to them.

VOLUME 34 OF INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

This issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION completes Volume 34. The reader who looks over the ten numbers which make up this volume cannot help but be impressed with the fact that the 230 authors, who have contributed the material which was published during 1945, really have done a very fine job in promoting the advancement of the workers in their profession.

Volume 34 contains a total of 528 pages of professional articles, tests, problems, projects, and news notes of various kinds, all of which represent an appreciable amount of material for the teacher in training and in service.

It is interesting to note that the articles published have come from all parts of the United States, and that they give a very thorough over-all picture of what is being done in industrial arts and vocational education in this country.

The articles, too, are quite diversified and cover all levels from the work in the grades, the junior and senior high schools, the full-time and part-time vocational schools, and the adult education classes. Volume 34 also contains a great deal of information about the educational system that was developed for the men in our armed forces, and for the preparation of civilan workers in our war industries.

Many of the articles also discussed postwar plans for the school. Some of these articles might well be re-examined by teachers and administrators, now that we are in the postwar period. If changes in our educational system seemed so important during the war, it is quite necessary that we do not forget to make them now that the war is over.

The index for Volume 34 is published separately, as it was last year, and those readers who want one must notify our circulation department of that fact. It is well to take care of this item at once for the supply is limited and it may be too late if the index is not ordered until months from now.

A SIMPLE FORMULA

The postwar problems that confront vocational education will require careful study and planning. Probably the best way of attacking them is to apply the principle enunciated by the late Dr. Robert L. Cooley when he was asked by a group of adults what the vocational school had to offer them, and when classes could be arranged to accommodate them if they decided to attend.

In his characteristic manner Dr. Cooley answered quite simply: "Our time is your time, and your needs determine our curriculum." This points the way very pertinently for those who are now preparing or reconstructing vocational courses for the returning veterans, and for displaced war-workers. The problem is to find out what the student needs, then analyze these needs and arrange the courses to satisfy the requirements in the simplest manner.

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by the school superintendent acting on the advice and counsel of the co-ordinator.

The length of courses varies with the occupations for which training is given. The minimum length is usually two years.

Place of Employee in Industry. The student or trainee is required to go into a business office, shop, or industrial plant, for the purpose of learning a specified business, trade, or occupation. The trainee remains under the direct supervision of the school and the training agency. The school provides the co-ordinator to assist in the fulfillment of the responsibility the employer and the school have accepted. The trainee has the status of a noncompetitive worker and must receive monetary compensation while employed. Employers must not capitalize on the student's earning power. The employer must co-operate in seeing to it that the student progresses from one work job to another, and that he has some experience in all phases of the occupation at the end of the training period.

Training in School

It is necessary that the trainee in a D. O. (diversified occupation) program be given general instruction aside from the specific training needed for his particular occupation. One regular period of the school day can be utilized in this manner. A general course such as how to get along with your employer, the value of appearance, how to improve your relations with fellow workers, will prove a great benefit to all employed students regardless of the type of work they are doing.

The Specific Training. Specific training is given largely on an individual basis. Frequently the employer can offer this training to the student on the job. Again, the technical training can sometimes be given by having the student enroll in certain trade classes offered in the school. An example of this might be that of a student in a printing shop. It might be possible to have him enroll in a printing class in the regular school course. No definite rule can be set up as regards the two types of training. Once again the matter is left up to the good judgment of the co-ordinator. He knows the pupil's needs. At times these needs can only be met by a combination of classroom instruction and on-the-job training.

How Trainees Are Selected and Placed

Great care should be exercised in the selection of the students in a D. O. program. The very first thing to be considered is the sincerity and attitude of the student toward the objectives of such a program. He may be looking for an easy way to graduation or something new and different. Again he may be a misfit. One of the necessary steps prior to selection is to examine the student's high school record as to attendance, and the like. A conference with other high school teachers about the student will prove a great help. The opinions of these teachers may be a valuable aid in selecting or rejecting the student. An interview with the parents should be made. The aims of the program and just how it fits in with the regular school course should be fully explained to them.

The Occupation

An occupation must provide two years of school and work experience. The field should be one which holds opportunity for employment after training. It should be one in which the trainee is assured of all-round training, and one which can be adapted to definite training objectives.

Steps in placing a trainee. A file of the trainee's personal record should be maintained. When a job has to be filled a list of applications should be obtained from interested and qualified trainees. These should be passed along to the employer and from his study, interviews can be arranged for two or three applicants or as many as the employer wishes to interview. The co-ordinator should arrange all interviews with the employer and prepare the trainee for the interview. This latter step would include a discussion on dress, appearance, steps in filling out an application and the proper leave taking of employer after the interview. After the interviews have been made the co-ordinator should find out the results by contacting student and employer. Such factors as time(schedules, wage arrangement, training agreement, and the like, are worked out to conform to the regulations as outlined in the state plan, and to meet the particular needs of the school, and of the community.

Advice to the Beginning Teacher

*Floyd R. Love**

This article is written with the idea in mind of trying to help the new industrial arts or vocational teacher with his first teaching job. In college so much time is spent in education that it is impossible to take any time out to study such commonplace topics as considered in this article. It was only after years of work that I began to learn that these ordinary contacts and experiences meant so much in carrying on and promoting a program.

I have had many years of interesting experiences in these two fields of education. Prior to that I worked for seven years in a skilled occupation. This trade experience has been invaluable to me because it gave me a chance to learn how the other half lives. Like many other young fellows I left college a bit overzealous about the promotion of my kind of work. If someone who had been in the work for years had given me a few tips, I could have kept from stubbing my educational toe a great many times.

There is no reason why everyone entering these fields of education should learn the hard way. I feel quite definitely that we who have had profitable experiences in them should pass those experiences along. This will help in saving time, energy and many unpleasant experiences for the young inexperienced person. If your attitude is right, you have a full life of service ahead of you and a chance to leave something constructive behind you. I hope as you read through these pages that you will feel, as I have stated, they were only written to help the cause.

A Good Way To Leave College

Here is your jumping off place to a job. The attitude you take with you to that job is very important, and will in most cases determine for you whether teaching is to be your chosen profession. I hope you have enjoyed your college experiences and leave it rather reluctantly and with gratitude in your heart for what it has done for you, but don't make the mistake of feeling that the world revolves around our colleges. There is an abundance of intelligence at work in this world that has not emanated from a college degree. Give the other fellow credit for doing things who has not had experiences similar to yours. Above all do not play up your college experiences all the time; the public may expect too much from you. A big buildup sometimes has a devastating backfire.

How to Approach Your First Job

From college to a job is a big step. The transition is quite abrupt and before you realize it you find yourself forced to move on your own power. You try to remember what you have been told but find it rather difficult. When you do remember and try to put some of it into practice, you may suddenly discover that it just won't work. It is at this point you discover that theory cannot always be put into practical use. You also learn that talking about doing a job is much easier than actually doing it.

Do not become alarmed when faced with these teaching problems. The only way to grow in any vocation is through the solution of problems. It is after you

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have discovered this fact in your shop that you start really going on your own power. Good teaching demands that this same principle be put into use. Schools, as a rule, are not enough concerned with the solution of life problems. A shop problem may not be a real life problem, but it can be made vital and the same processes used in solving it that would be used in solving any life problem.

The idea is to let your boy discover through guidance that he is up against a problem when tackling a new job in the shop. After the problem is identified he should be helped in setting up processes and procedures for solving it. When this has been done he starts putting his thinking into action. At the completion of his action a checkup should be made to see whether or not he has done a good job of thinking through his problem. If he has not, then determine what changes he would make if he were to do the same job over again.

If we try to profit from our own experiences we follow this same procedure in thinking through all our problems. We may not be conscious of this fact because our action, in most cases, becomes automatic. You can't afford to have a boy sit down and consciously think through all these steps every time he planes a shaving off a board but you can help him to set up these habits unconsciously. Always remember a shop is one of the best places in school to really teach a boy to think. When it is used for any other purpose it loses its educational value.

I would advise approaching your job with confidence in yourself. Show a co-operative spirit and a willingness to learn from others regardless of their positions in life. Make yourself useful outside your own department but don't push yourself into places. This brings up the next topic I would like to talk about.

Profitable Contacts to be Made

This heading may have a ring of selfishness in it. Education like business must show a profit or cease to exist. These profits are not measured in dollars and cents but in terms of service to the younger generation. The one common criticism that is constantly voiced against our educational system is that it is too much isolated from the real things in life and too much concerned in defending its own methods and ways of doing things.

If you really want to contribute something to the school system in which you are working, be sure and acquaint yourself with the community in which the schools are operating. Do not restrict your leisure time association to just school people. I know they are fine folks, but too often school problems and shop talk becomes the center around which all interests revolve.

Your first contacts must necessarily be school people. The first impression you make on them is generally a lasting one, so be careful. I remember one year having had a new teacher at my first yearly meeting who talked a bit too much. The members of my staff were anything but impressed and dubbed this fellow the big shot. For after that, as long as he was with us, he was referred to by that title.

After your school contacts have been made, try and make your necessary business contacts as soon as possible. Just meeting the folks with whom you are to trade and soliciting their aid will contribute a great deal toward future business relationships. I would like to add something here that I think will be of great value to you. When ordering supplies or equipment of any kind from a business house be sure and use the usual trade or business terms that commonly identify the article. I do not know of any one thing that will contribute more toward belittling your ability in the eyes of businessmen than this one practice. I have heard them say many times when goods have been inaccurately ordered that they do not see how a man can do a good job of teaching when he does not even know how to order his common supplies correctly. To order 10 pounds of 8d nails is a fatal mistake. Be sure and specify what kind of an 8d nail you want. Be specific in your ordering.

One of the best places to get in wrong, right off the bat, is with the lumber industry. Hard and softwood dealers have different methods of grading, so be sure and know how to order or you may even get gypped. I have heard salesmen say if they wanted to be dishonest they could sell schools short most anytime they so desired: The majority of salesmen are honest and will help you in ordering materials if you solicit their aid. There are a few, however, who if they discover your weakness will take advantage of it.

If you can so arrange your teaching time I would advise joining a service club. I know it will cost you something but I feel sure you will find the contacts you make very much worth while. As a rule, the membership of a service club is a good cross section of the community. You will meet men from all walks of life, from minister to bartender. They will become interested in you and your work, if you show an interest in what they are doing. This will also enable you to get a good idea of your community in a relatively short time. Try and show them that schoolmen are not all old maids, even though the movies do place us in that category at times. Try and not lean over backwards to show them you are not a sissy or it may give the wrong impression. You don't have to be tough to be a man. If you are a lodge man I would advise getting into action with them for the same reason as joining a service club.

Last but far from the least, if you are a churchman, be sure and make your contacts there as soon as possible. Your choice of a church should not be made because of its contributions to your work. Your decision should be made rather upon where you feel you can render the most service. To join any organization because your superintendent or the president of your board of education belongs to it is a very insufficient reason. No matter what church you belong to, if you are a good member, your influence will be felt in your community and reflect directly in your schoolwork. If you are a good churchman, and I hope you are, do not make the mistake I have seen made several times by teachers, in questioning students about their faiths. Try and remember this, you can influence boys more by the way you perform in your community than by preaching to them. I know — I have seen both in action.

How To Build Up Your Department

There is enough to be said on this subject to make volumes of reading. Every teacher, if properly guided in his college training, leaves his Alma Mater with this one thought uppermost in his mind. Unless you do have it your work will only be a job-holding proposition. To keep your work just as good this year as it was last year gives very little food for thought, or a chance for any growth. Just keeping your teaching methods in step with the developments of the raw materials with which you work is a big job in itself. Science is constantly at work inventing new materials and changing the old ones. Don't be afraid to do some experimenting. Skipper Allen used to say, "If you have an idea you are in doubt about take it home and try it on the dog; if it doesn't kill him then try it on the kid." Another thing to remember is, try and set aside a small budget from your salary each year to buy new books about your work as they are published. I would advise setting up a library of your own even though the school will buy the books for you.

Here is one thought I want to impress upon your mind, do not attempt to build up your department by comparing it with other departments in your own school system. Never belittle someone else's stocks to build up your own. In the early developments of the vocational program this was sometimes resorted to. At times, however, because of the attitudes of certain school departments the vocational heads were practically forced to pull out their old hammer and go to work. That did not last long for they all began to see that a knock at one school program soon backfired on all the other programs.

If you and your department want to do things and go places, then don't be afraid to help others. This co-operative spirit will do more toward your own growth than any other procedure I know about. Don't just pretend to be interested in the other fellow's work. Find out where he is going and why. Everytime you do this it broadens your educational horizon, and helps you to see your own school system as a whole, and keeps you from becoming departmental conscious. Departmental jealousies will do more to stalemate a school system than any other one thing.

If you have an idea about how to put some mathematics into practical use in your shop, talk it over with the mathe-

matics teacher. If the boys are weak in arithmatic do not emphasize that fact, it may put the chances for co-operation into back gear. Show why you are interested and that you are willing to take a few minutes periodically to help your boys retain some of their mathematics, by helping them to put it to practical use.

Subjects such as general science, English, and others may be closely hooked up with your shopwork, but time will probably keep you from doing very much with all of them. When values are shown in co-operative work, shop time may be extended to do some of this work. You can't afford to lose sight of the objectives in your shop, but through organization and planning, you can give your work more meaning and value in the eyes of the other school departments.

Never shy away from extracurricular activities. It is a good plan when entering a new school department to let your superiors know what interests you most along this line. Be careful about loading up too heavy on this work or you may find yourself neglecting your regular job to take care of the extra one.

Be A Good Listener

I have seen this principle for getting along in your work, put into practical use in my own department. Years ago a fine looking young Irish boy from Minnesota, who had been graduated from Stout Institute started working in my department. He lacked practical experience but made up for that by his eagerness to listen and learn about what the other fellow was doing. Connected with this eagerness was a pleasing and dynamic personality that just made you want to help him in every way possible.

In professional meetings he never failed to take notes and then discuss them with you at a later date. He never talked too often or too much at these meetings. He never failed to be interested in you and your problems. No matter who he was talking to, be it janitor or superintendent, he manifested the same interest. I never saw a man who profited more from his contacts and experiences. My department soon became too small for him because larger communities began recognizing his abilities and offered him more salary than my board of education could pay.

Another good quality this young man possessed was, he never repeated what he learned, while listening, unless it helped someone else constructively. You could tell him anything in confidence and be sure that it would go no further. He was not afraid of hard work and worked on the principle that by helping you he could not keep from helping himself. Through his fine habits and good personality he made many friends. His friends were all for him one hundred per cent and were all pleased whenever they heard that he had taken another step up the educational ladder. Through hard work and a willingness to co-operate with others he has worked up to an assistant superintendency in a large city in California.

I'm not advocating that all good listeners can do what this young man has done. There aren't big jobs enough to go around for all of you but you can go places and do things by listening and profiting from the experiences of others. Trying to be a big shot when you aren't will soon catch up with you. I have also seen that illustrated in my own department. Always remember this, if you are doing a good job, someone will soon find it out. You don't have to shout about it or push yourself into places. Be sure and have your bearings before stepping out into fast company. People with years of experience can sometimes ask a beginner some very embarrassing questions.

Give the Other Fellow Some Credit

One of the best ways of killing progress in your own department is to take credit for all the worth-while things that are being done in it. I have seen this idea in action many times, and wherever it has shown its head, real progress soon became a dead issue. The only way progress can be made is by patting your fellow worker on the back and telling him that he is doing a good job. Do not stop there always but be sure that someone else knows about it besides yourself. Publicity in the local press about what some teacher in your department is doing just can't keep from helping all concerned.

Before anything about your work is given local publicity be sure that it is not going to boomerang. Give plenty of thought to each article, and be sure that it does not involve doing a job that some local union group or employer feels that they should be doing. If you have a situation that might get you involved with these groups, be sure and get their approval before doing that particular thing. I have found, as a rule, that these two groups are fine folks to work with if they understand your problems. In certain situations, however, it is best not to advertise how much you have saved your school department by doing a certain job.

If you are fortunate enough to have nice things done for you by your local industries or labor groups, be sure they are given proper credit. If business houses give you special consideration on discounts for school purchases be sure and let them know that you appreciate it. I would advise though, never asking for personal discounts because you give them some of your school business. This may obligate you in a way that may become very embarrassing.

If your school administration gives you what you consider the necessary supplies and equipment to do a good job in your shop, be sure and let them know that you appreciate it. If it does not give them to you, be careful about broadcasting it too much. You cannot sell your superintendent or board of education on your need for things by belittling what they have done for you. If they refuse however, to see your problems and certain business people and labor groups do, then let them do the pressuring for you. School administrations usually want to do what the people of the community feel is necessary. I would not advise making this a common procedure, but it does work. I have seen it in action many times. I had one shop nearly fully equipped by local business houses when they learned that the board of education lacked the ncessary funds to do it themselves.

When you deserve credit for doing a good job you should have it. There is one thing to remember, however, try and not overdo it. If you must have your picture in the local press, don't let it happen too often. The folks in your community will know who you are and what you are doing without staring your picture in the face everytime they open their evening paper. I saw this kind of advertising contribute plenty toward helping a good administrator lose his job. I am sure as I look back for thirty years and see the developments in my department, that I owe all of it to my fine group of teachers. Your department can never be any better than your teaching force. What that force contributes toward progress depends on giving it a chance to do a good job, and then in giving credit to those who have done the job.

Do Not Try To Fool Anyone

You probably know what P. T. Barnum said about fooling the public. That same idea holds true in a school system. Too many of us in the teaching professions have a fear of admitting that we do not know. You can get by for a while on bluffing but if it is continued too long it will eventually catch up on you. I once had a friend who taught a class of second-year Latin who had but one year himself. He worked very hard and got by with it but said he would not recommend it as a common practice.

I really think the hardest person to fool for any length of time is a good wide-awake boy. It does not take him long to find out that you are bluffing. When he does discover it, look out, for it will not only be a short time before more than he are asking you embarrassing questions. A teacher who admits once in a while that he does not know will get into the good graces of a boy quicker than one who knows all the answers all the time. He will seem just a little bit more human. To make a common practice of this, however, will eventually make a boy lose confidence in you. A good plan to follow is, bring in the answers eventually if they are of vital interest to the solution of some problem, or effects your future relationships with an individual or a group of individuals in a class. If you can direct a boy where to find certain information, that both of you are in doubt about, and he gets it first, then give him credit for being on his toes. Let him make a report to the class if it involves all of the students. This will make the boy feel important and give him an incentive to do some investigating on his own.

An industrial-arts or vocational teacher makes so many contacts outside the school department that it pays to be cautious about them. You make a practical home contact every time you send a project home. If you have done any bluffing in the construction of that project, Dad, Uncle Jim, or some relative in the family is going to discover it, for they will all see the fine job little Albert made in the school shop. If it contains many defects, sometimes that news travels faster than merited comments.

To some extent, every time you make a home or a business contact, you help sell or sell out your school department. I do not mean that you have to be absolutely free from defects all the time. A perfect person never has and never will enter the teaching profession or any other kind of a vocation. What I am trying to say is, that we as teachers of practical subjects have an opportunity to help sell, not only our department, but the whole school department, to the community in which it is operating. Too often in the eyes of the public a school system is judged by the action of a few, rather than by the behavior of the teaching force as a whole. If some teacher is getting public panning and it is unjust, and you know it, do not be afraid to go to his assistance or be timid about getting other people to help him. Good stiff backbones are needed in the teaching profession, if we are to hold the respect of the people who support the profession. If you must fight do a good job of it and maybe in the future there will be less disturbances to squabble about.

Why Be Afraid

If the facts were known I am sure we would find that fear has killed more folks than disease. I know from own experiences and those of my friends, that it has killed more ambitions and aspirations in the teaching profession than any other one thing. A real fearful person can never really be a successful individual because his fears will always stymie him.

If you go to your first job full of fear you are half licked to begin with. Sit down calmly and make inventory of what the job demands of you and what you know and can do to meet those demands. You will be surprised what this will do for you. If you find the going will be tough then make immediate plans to meet your most difficult situations. Above all, do not wait until the first day of school to do your planning. Try and keep at least two jumps ahead of your class, for if they once catch up on you, you will really find the going anything but pleasant.

If you are head of your department, do not be afraid to have a man in it who has had more training than you. Teachers who know where they are going and why will have very little reason for fear. If these two objectives are not clear in your mind, but are in the mind of your co-worker, then you had better get busy and get the philosophy of your work straightened out in your own mind. Responsibilities generally gravitate toward the folks who can handle them.

When your superintendent, principal, or department head steps into your shop do not become nervous. They are anxious to help, not criticize you. You are just naturally giving them a chance to criticize when you get nervous or fearful for it is bound to react in the conduct of your class. Be sure and do not take constructive suggestions as criticism. Show appreciation for their interest in you and your problems and you will soon have a very pleasant working relationship set up.

Last but not the least, do not be afraid to tackle a new job even though you know it is tough. You may think I am contradicting some of my previous statements but I am not. If the job has demands within the realm of your training you will not have to do any bluffing to handle it. An experience in handling a difficult problem aids automatically in your educational growth and development. This thought brings to me another topic of consideration.

Education and the Alphabet

Folks who give our present Democratic administration credit for manipulation of the alphabet, for group or individual status, have never turned their attention into the educational field. We have been classifying and pigeonholing our efforts for years on an alphabetical basis. You cannot get a job any place without first being asked what combination of the ABC's you have tucked away in your back pocket or on the dusty top shelf of your own home library. In many school systems what you earn depends entirely upon your alphabetical combination.

You cannot go places without the necessary prerequisites so just make up your mind to go and get them. Try and do this while you are comparatively young and have plenty of time and energy. As job and family responsibilities begin to multiply you will start finding it more difficult to attend summer sessions for advanced work or to take a year off once in awhile. Try when you go back to college to take subjects that apply directly to your teaching problems as well as toward an advanced degree. The colleges are getting more liberal in their requirements so it is possible to do both jobs at one time.

I hope you do not get the impression that I do not believe in setting up standards. Any kind of a job that is worth while needs necessary prerequisites for workers to do that job. The only thing that seems unfair at times is that many of us with a two-letter combination, and who have ability, cannot accept or be considered for certain kinds of jobs until our combinations have been changed to three letters.

If you feel the necessary requirements for an advanced degree are a little haywire, and they may be, do your complaining after you get your degree, rather than before; it may be less hazardous for your future. Try and fit into the picture the best way you can. Just keep on sawing wood and run around the educational track the required laps and you will soon have all the necessary requirements worked off your score card and a chance to step up in the teaching profession. College folks are fine people and will co-operate with you wherever they can.

Taking on the Laggards

I have found in my contacts with public school shopmen, be it industrial arts or vocational, that they all have a common ground for wailing. If you are ever in a meeting that lacks for animation, just ask this question and see what happens — where do they send the dumbbells in your school system?

We all know the answer, the shopman gets them. By the time this group gets to the shop, they have made the rounds of the school possibilities and here they are at the end of their rope. Don't throw down your tools and quit work just because the presence of these kids makes you angry. When you are in that frame of mind you will not know what to do with them. The least you can do is give the poor kids a trial.

I have had a school under my supervision for years, where boys are sent that do not care too much about attending school. Every time they see rows of school desks with a teacher's desk parked in front of them, they get the heebie jeebies. To help overcome this reaction we tried to make the school a little different. In the place of school desks we started using long tables and chairs. Instead of them having to sit all day back of a book they were allowed to work half time in the shops.

I have seen hundreds of boys go to this school who were labeled as beyond school help that have developed into first class American citizens. A day seldom passes that a graduate in the armed forces does not call at this school to see some of the teachers. What surprises us at times is to find some of them that were our greatest problems are now holding commissions. This is not meant as a slap at our army. These boys had plenty to think with. They just lacked incentive.

Some of the boys that have been slowest mentally in this school have really done things and gone places that have surprised all of us. In fact, most of the teachers have quit predicting the future of a boy by his reactions at school. There are, of course, certain criminal tendencies in some that you just know will get them into trouble. No matter what you do for them, they seem to be set on going their own way. All you can do in these cases is love and pray that your contacts with them will some day bear a little fruit.

Boys of this type should never be put into a vocational course unless you are sure they can profit from the instruction, and that they want to get into that specific type of work. The industrial-arts shop is the best place for those who cannot decide on a specific vocation. Try and fit your program to their needs, and see if your administration heads will not let you keep the boys in the shop half time if you feel

that is what they need. I have always felt that an industrial-arts program should be set up so that it will meet individual as well as group needs. This cannot be done, however, with a pigeonholed and cut and dried program. Whatever you do, if you should come up against this problem, let your administration heads know that you recognize it as such, and then solicit their aid in helping you to solve it. If you take the initiative most administrators will be glad to help in any way possible.

Try and Avoid School Politics

A good way to get yourself into a bad spot is to start dabbling around in school politics. To go out and start canvassing for votes for a particular person will get you into some trouble. I had a very dear friend who was a local director and always bragged about helping to get the right man on his board. He worked it very well a few times but the last time he tried his candidate lost out. Not long after that this director was looking for another job.

I know that some may think I am all wrong about this, for they may know men who were promoted because of politics. That sure is true and I also know some. I realize that the larger the city the more politics you have to play to get an administrative position. Most of you beginners will not aspire to be an administrator to start with, and you will probably be in a smaller community where checking up on you is comparatively easy.

If you have to play politics to get a better job be sure and do not throw mud at any one. Make the issues at stake clean cut and do not let an advance in salary be the motivating issue, but rather a desire to be of more service to young people. This may sound a little far fetched to you, but believe me, I know from experience that when you look back on your accomplishments most of your satisfaction comes from having been able to do something constructive for the young folks in your department. I know that these experiences cannot be used to buy the necessities of life, but you will be surprised if you practice them, how they automatically work toward a greater income for you. This seems to be getting away from politics but I feel it is worth giving consideration.

Don't Sit on the Fence

I hate to say this, but I know real well you are going to run up against a fence sitter some time in your school career. Who are they or what are they? Those are the fellows who ride the educational fence and jump with the tide. The bird who is always willing to jump in the most popular direction. One who takes on the board's decisions rather than risk making one of his own. If you should be fortunate enough to work with such an individual, I'll bet you ten to one, you will never be able to get a direct decision from him. What you are requesting will always concern someone that will have to be contacted before a decision is made. This is one way of attempting to keep in the graces of all concerned. The greatest trouble with these fence decorators is that they soon develop into the finest alibi artists you ever saw. They just cannot help doing that for it is impossible to make decisions all the time that will not ruffle someone's feathers.

This is not an ethical thing to do, but sometimes you have to shoot over such an individual's head if you want to get anything done. The best practice, however, is to always go through the right lines of authority. If you have done this and no interest in your problem is manifested, and you do not care for your present job unless something is done to solve the problem, then let your conscience be your guide. Remember this, have everything above board and lay all your cards on the table.

You can never find a better group of people to work with than school folks. The majority of them are looking out for the welfare of the younger and will always lend a sympathetic ear to a constructive program. The teaching profession is like any other group of workers, there are some in it just to earn a living. If this happens to be your motivating power, you had better drop out before you get started. There are lots of other places to earn a living where you will do less harm to the coming generation.

I do not know of any work, where sincerity of purpose will pay more dividends than in the teaching professions. These dividends cannot be stored away in your safety deposit box but they do carry a satisfaction much more gratifying than material gains. If I could start my life all over, I feel sure that I would prepare for the teaching profession again.

The Successful Industrial-Arts Teacher

*P. E. R. Ammons**

Desirable Personal Qualities of the Successful Industrial-Arts Teacher

Physical

The personal qualities desired in the successful industrial-arts teacher consist of a combination of informal traits, tendencies, and acquired characteristics. Before attempting to teach industrial arts, he should decide whether or not he possesses any native peculiarities which constitute serious handicaps of his own success as an industrial-arts teacher, or to the effectiveness of the work he proposes to enter. Physical deformity and mental deficiency are two natural handicaps and cannot be overcome to any appreciable degree. A one legged person would have a physical handicap and would not make a successful industrial-arts teacher unless he is teaching shoemaking or something that will not require one to be on his feet most of the time. A one-handed person would also have a physical handicap in attempting to teach industrial arts. However, I have seen a one-handed man hinge and fit mortise locks on five doors in one day, but this is an exceptional case. Aside from physical deformity and mental deficiency, the acquisition and development of the qualities desirable in an industrial-arts teacher are largely products of individual ambitions and perseverances.

The most desirable physical qualities of the industrial-arts teacher include personal appearance, health, and manipulative ability. There are no standards of weight, height, nor complexion which can be agreed upon for all teachers, but the teacher's bearing should suggest at once the possession of all the other desirable traits.

In the matter of dress, the successful industrial-arts teacher can never afford to be careless or slovenly, nor on the other hand should he be flashy or conspicuous. He should at all times dress neatly and appropriately. Under some conditions, appropriate dress for the shop may include a shop coat or other covering, and a shop cap, but there is no place for unkept or inappropriate clothing. It is essential also that the industrial-arts teacher be just as scrupulous as any other teacher in the matter of keeping neatly groomed, and this is one very important item in securing and maintaining for the industrial-arts department, co-ordinate place with other departments of the school.

It is essential that the shop teacher possess good health and that he learn to keep himself in the best possible physical condition.

Manipulative skill is in part a matter of native endowment, but specific abilities applied to the numerous kinds of activity are largely acquired. It is the shop teacher's duty to acquire high degrees of skill in the various activities for which he is responsible.

Mental

The successful industrial-arts teacher must possess a high degree of general intelligence, which may be indicated in three different ways: by result of intelligence test; from records of past educational performance as a student or teacher; and by the application of what

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is called common sense. The successful industrial-arts teacher possesses a desirable mental characteristic of self-directive ability, revealed by singleness of purpose; by continuity of effort in all undertakings, and by the conservation of time. Self-directive ability may be an independent quality in a person whose work involves little contact with others, but in the teacher it constitutes a foundation for leadership — the ability to direct the activities of others. The industrial-arts teacher must be able to direct effectively the efforts of individuals and class groups. Not everyone possesses leadership qualities, but surely no one who does not possess leadership qualities should undertake the responsibility of teaching.

A desirable collection of mental qualities is of little avail unless attended by capacity of growth. If the industrial-arts teacher's contribution to general education is to become broader and more valuable as time goes on, he must be capable of growth in general fields. Improvement in his own particular line depends upon growth in that as a specialist. Therefore, with the mental qualities of the industrial-arts teacher, the degree of attainment at any particular point is not so significant as the capacity for growth.

The successful teacher knows that what is best today may not be so tomorrow. He is sure that change is the law of life and that there must be no set patterns for all schools or all individuals to follow.

Moral

Moral qualities may be spoken of as another group of desirable personal characteristics of the successful industrial-arts teacher. To begin with, he must be inherently honest. He must understand that honesty involves much more than the respect of money and property rights, and he must be ready to maintain absolute honesty under all circumstances. It is essential also that he shall be able to see that honesty is often a matter of relationships with oneself as well as with others.

Another desirable quality, often confused with honesty, is integrity. The teacher must be absolutely dependable in written or spoken words. He must be conscious also of the special applications of integrity in industrial-arts work. Every material product represents the integrity of the worker in the degree to which it is genuine and free from sham. He has an excellent opportunity to demonstrate his own integrity in this way, and to utilize the work for the development of integrity in the pupils.

The teacher should carry the quality of dependability into every activity, both in school and outside, including punctuality in meeting his classes and all other scheduled appointments, making reports, and helping to keep the whole school program going on schedule. He should be trustworthy in every relationship, and a little more.

Sincerity is an essential quality of the industrial-arts teacher, as expressed in an open countenance, a straightforward attitude, and a lack of any kind of affectation, and finally, the teacher must be possessed of a marked degree of self-control, without which no teacher can expect to have much control over those in his charge.

Social

The teacher cannot afford to neglect the desirable social qualities which should be cultivated in himself and inspired in his pupils. One of the most important of these is courtesy which is expressed through thoughtfulness, kindliness, and helpfulness. The application is largely personal or individual, but the expression of positive social qualities contributes in a broad sense to the general good.

It is essential also that the teacher give attention to what may be considered more routine matters having to do with observance of accepted conventionalities. The occasional individual may take some delight in "shocking the public" by always being a little different from anyone else, or behaving in a manner not usually accepted, but the teacher should know that his success under most conditions is assured by conformity to what has come to be generally accepted as substantial behavior, and by being content to remain inconspicuous in most circumstances.

Aesthetic

The acquisition and development of aesthetic qualities may seem somewhat tangible, but it is perhaps more important for the industrial-arts teacher than for any other to develop some appreciation of art, since it bears so close a relationship to his work.

The richness and completeness of any teacher's life and usefulness are increased through the development of appreciation for the finer things in music, ethics, and religion. None of these things can be omitted without detraction from completeness.

Training and Professional Preparation

General Education

Since vocational education in the trades and industries has become more fully developed, the relationship of the teacher of industrial arts to general education has become more clearly defined. A broad general education is now considered as essential for the industrial-arts teacher as for any other teacher in the system. He should have a complete elementary and secondary school education, and a college course of not less than four years.

Until recently many institutions offered two-year courses of training, and in many places certificates of graduation from such courses were accepted as adequate qualification for teachers of industrial arts as a part of general education. The requirements have been gradually raised, however, until now it is quite common to require four years of college work instead of two. Very significantly, the industrial content of the college course has not been materially increased, the time for the two additional years being utilized in giving the prospective industrial teacher a broader outlook on a more comprehensive conception of general education in the public schools.

The requirements in general education should be as high as for teachers of senior high school industrial arts as for teachers of any other subject. It will soon be possible to require the master's degree for industrial-arts teachers as it is in so many schools for other teachers. On the technical side the requirement is little different from that for the junior high school industrial-arts teachers, although the work will be somewhat more intensive and advanced. The foregoing applies to teachers who are employed for teaching industrial arts as general field. They should have breadth enough to teach any of the subjects belonging in this field for general educational purposes.

Where the courses are vocational in purpose, then the teachers should be specialists to the extent of having had training through productive industrial work in the fields they are to teach equivalent to that of the journeyman workman. They should also have had training for teaching, and they should be temperamentally inclined to teach rather than to produce. Many excellent workmen make very poor teachers. The vocational teacher should know his field and should be a good workman, but he should also know how to teach and be at least a college graduate. As soon as it is possible to prepare them, vocational teachers should have general education equivalent to that represented by the master's degree. For a time it will be impossible to find enough men with as much general education as this who also have sufficient vocational experience and teaching ability. The superintendent will do well to recognize the requirements set up by the Federal Board for Vocational Education and secure as much as he can in terms of general education. In time, men with the master's degree will be available for vocational school positions, but with the rapid increase in the number of such positions that time is somewhat distant.

A successful and progressive industrial-arts teacher is one who is "going places." He is striving toward goals not yet realized. He thinks in terms of what lies before him. The unprogressive teacher is like the fireflies that let their "trails illuminate the past without casting their light on that which lies ahead."

The progressive teacher does not "fiddle while Rome burns." A few more or less objective evidences of a successful teacher are herewith enumerated:

1. He keeps up on current events, especially on those that have a bearing on what he teaches.
2. His shop rates high in pupil activity.
3. The atmosphere of his shop is natural, congenial, and democratic. He is the recognized leader but not its despotic ruler.
4. He participates in community affairs — particularly in scout, hobby, craft, or athletic affairs in which his pupils have interests.
5. He keeps up to date through profes-

sional reading, school journeys, conferences, and teacher improvement courses.

6. His interests are broad and he associates with those who are not content to rest upon such past achievements as may be theirs.

7. He makes all the contacts possible with community enterprises, with industrial establishments and with parents.

8. He gives evidence of professional growth through contributions that will improve educational practices locally and elsewhere.

Professional Training

The professional part of a teacher's training should include the fundamental courses in educational subjects which are planned and offered for all teachers of the grades or years of school in which he expects to teach. In addition, a substantial part of his work should consist of professional studies in the special field of industrial-arts education. This should not be confused with manipulative training in industrial-arts courses. The point of weakness in most industrial-arts teachers has been not in how to do the work themselves, but in how to teach it to someone else. The total amount of professional training taken by the prospective industrial-arts teacher should equal the professional training required for other teachers of similar rank.

Technical Training

The technical training necessary for the industrial-arts teacher includes a generous amount of informational content; general and special scientific study; fundamental mathematics; and broad occupational analysis and observation.

The manipulative phases of training have dominated the training of industrial teachers to a great extent in the past. They are still as essential as ever, but require some recognition, and redistribution of emphasis. Such training should include representative activities commonly taught in the public schools, and may well include special features of interest to the individual. Surely it should provide also for training in such special fields or work as will be required in the larger schools. Some training courses in the past have been constructed on the assumption that every teacher would become a specialist in a highly organized industrial development. There is fully as great a demand for the teacher who can teach several lines of shopwork and handle the entire department.

Practical Training and Experience

Practical training and experience constitute an important phase of the industrial-arts teacher's equipment. Such experience as a wage earner in any trade or industrial occupation is highly valuable for the sake of getting the worker's point of view, learning the everyday requirements of industrial employment, and acquiring firsthand knowledge of the world of industry which the industrial-arts department aspires to interpret to the boy. So it may be concluded that a comprehensive general education coupled with substantial practical experience should go a long way toward preparing the industrial-arts teacher, possessed of desirable personal qualities, to overcome many of the past prejudices, and reveal the educational values and logical position of industrial arts in education. Therefore, the successful teacher must use the best teaching techniques, the most interesting and challenging approach to every lesson, and the most varied appeals to a wide range of interests and abilities.

Problems and Projects

HOBBIES MAY HELP

J. G. FULLER

Canadian Vocational Training Center
Medicine Hat, Alberta, Canada

Fortunately, victory is ours and our armed forces are returning to their homes and families.

Among them are the disabled veterans who are being invalided home minus limbs, or with other physical or psychological deficiencies. It is to these we owe our greatest debt and their attitude toward the future will depend on whether or not they can be made to feel that, even in their incapacitated condition, with special training, their loss may eventually become a gain, as it did for many after the last war, at least from a remunerative point of view.

The ability to *make things* with their hands will play a large part in raising the morale of these men because their hands are closely associated with their minds and man's ego is expressed by what he can accomplish with both. Encouraging these boys to learn handicrafts enables them to make useful and salable articles during their convalescent period, increases their self-reliance, and gives them greater confidence in their own ability.

Leatherwork is a craft that is specially adaptable to this purpose because a variety of small useful articles can be made that are in real demand.

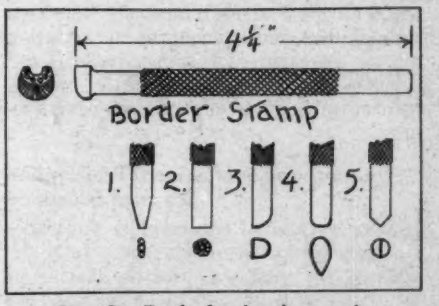

Fig. 1. Tools for leatherwork

Fig. 2. Hand-tooled belt

Fig. 3. Wrist watch strap

The work is clean, interesting, and requires but a few inexpensive tools, very little skill, knowledge or exertion, and may be successfully carried out by wheel chair or bed patients.

With the exception of a small belt punch, the tools shown in Figure 1 are sufficient to make any of the articles illustrated, and the complete set can be purchased for about two or three dollars.

Design in this work is simple, easily done, and follows along conventional lines as the rhythm must be maintained to give a pleasing effect. This is done by drawing two parallel lines (not less than ¼ in. apart except for very fine work), representing a vine or stem in rhythmic curves or circles throughout the desired space. The balance of the piece of work is then filled in with leaves, flowers, and the like.

Semirelief may also be used to good advantage by those who have some artistic ability, by simply *cutting* the outline and shading to bring out depth.

The design may be drawn on paper and traced on the dampened leather with a steel point. While the leather is still damp, or after it is dampened again, the outline is *cut* with a swivel top cutter, or with stamp No. 5 in Figure 1. Care should be taken not to cut off any part of the design as this breaks up the rhythm.

After the outline has been cut the groundwork is stamped using tool No. 1 for the outside and small corners, and finishing with tool No. 2 for the larger parts. The shading is then done with tool No. 3, and the shading in the leaves and flowers with tool No. 4.

The tools should be heated over an alcohol or gas flame, but care must be taken not to overheat the tool and scorch the leather. A hardwood stick approximately 1½ by 1½ by 18 in., rounded in the center where it is held is used for striking the smaller tools while a rawhide mallet of fairly good weight is used on the larger tools such as No. 4, border stamps, and the like. A polished stone is the most satisfactory surface on which to stamp the leather, but a smooth iron plate or a block of hardwood may be used as a substitute. The use of the hot tools gives a more pleasing effect and by cutting and stamping the design will last indefinitely.

Fig. 4. Hand-tooled leather belt

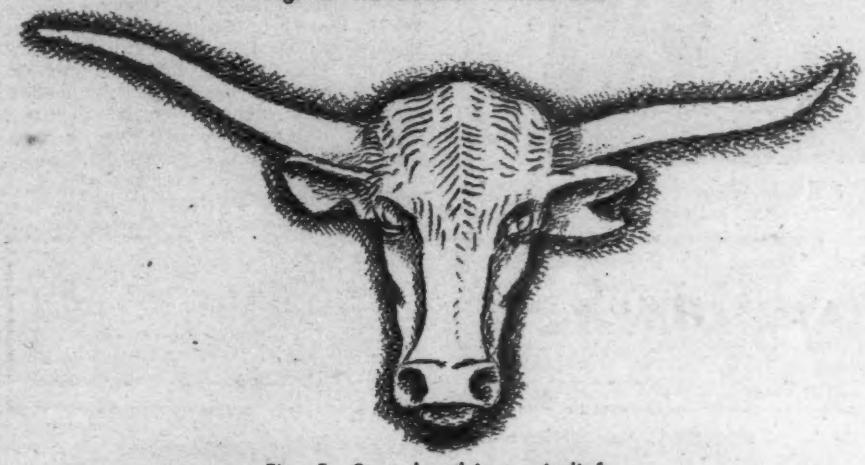

Fig. 5. Steer head in semirelief

No attempt has been made here to give any detailed instruction in this craft, but rather a wide outline of what may be accomplished with the presumption that it may be useful to those interested in the rehabilitation work previously referred to. I doubt if there is any craft as easily learned that turns out so many useful articles, and the disabled veteran who takes up this work as a hobby will find it fascinating, profitable, and a future asset.

COSTUMER HOOKS

C. F. ZAENGLEIN

High School
Circleville, Ohio

No doubt many shop teachers have encountered handicaps during the war period in obtaining the necessary supplies and equipment. It is still difficult to obtain materials, but there is always a way of handling such situations if enough time and energy is spent on them.

We had quite an unusual incident happen in our eighth-grade woodwork classes this past school year. When it was time for the students to choose their woodwork projects, 18 students decided to make hall trees. When they had them about half finished, we were informed by our supply firm that the metal hooks were not available this year. After a pause of disappointment, we informed our metalwork class of our misfortune and asked them if they would like to make six dozen costumer hooks in quantity production style. They unanimously gave an affirmative answer. In a very short time the metalwork class had them completed.

The instructor made a sample of the finished project which after all means much to a student. A sample of each step was also made and given to each group working on the project from the first to the last step operation.

We used the factory system of construction for quantity production and this was really appreciated by the metalwork class, for they realized the educational value it had on such a project.

The process of construction involved the making of jigs, cutting and cold bending, drilling, riveting, seaming, grinding, welding, filing, shaping, and finishing.

A reliable boy was chosen to give the finished project a final inspection before the finishing material was applied.

MATERIAL FOR ONE HOOK

No. of pcs.	*Material*	*Size*
1	Round iron	¼ x 10½ in.
2	Round iron	½ x 7/16 in.
1	Black sheet metal	20-gauge
1	Round-headed rivet	⅛ x ¼ in.

Order of Construction

Draw horizontal and vertical lines ½ in. apart covering a space on the drawing paper to the size of 5 by 6 in. Trace the shape of the hook as shown in Figure 1.

Make a jig to conform with the arc from *A* to *B*, out of ⅜ by 1½-in. flat iron. The other jig should be made to conform with curve from *B* to *C*. A large pipe was used for the curve at *D*.

Cut stock to length and size. Grind ends of round iron square. Three inches from lower end of hook, swage or flatten a short distance of hook 1¼ in. long, using a piece of steel exactly 1¼ in. wide and a sledge hammer. The rod should be flattened to a thickness of about ⅛ in., and a width of approximately 5/16 in. Flatten one side only, as shown.

Next cut two small pieces of ½-in. round rod 7/16 in. long, using the hack saw. Center punch center of the ½-in. round pieces, and drill ¼-in. hole through the pieces.

Place small pieces on each end of long piece flush with tip end and spot weld one of the

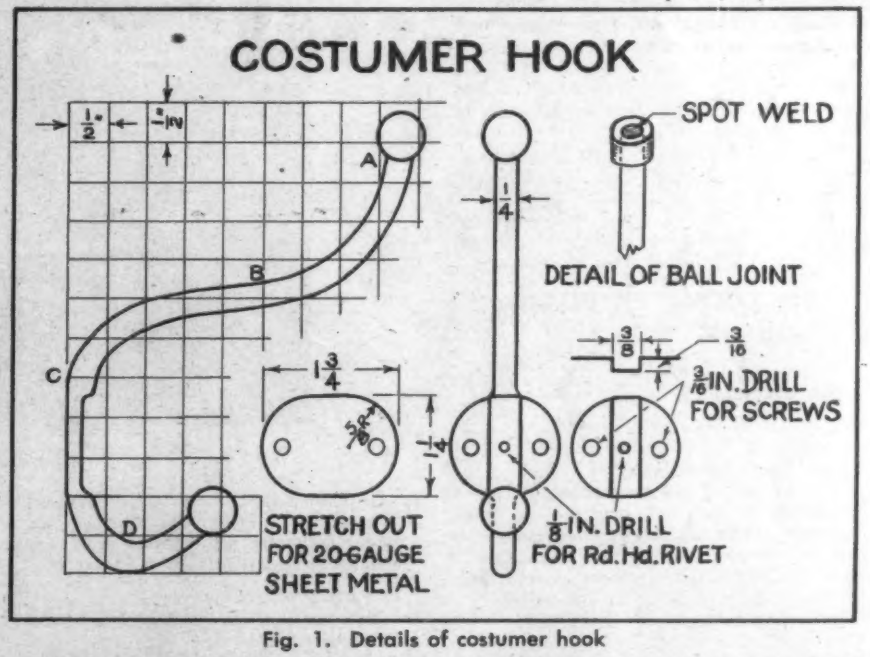

Fig. 1. Details of costumer hook

small pieces securely to each end. Then grind a round-shaped nob or ball at each end. Bend hook to shape using jigs. A template should be made to check for uniformity in making a quantity of the hooks.

Cut out flat pieces of sheet metal to the shape shown in Figure 1. Place these pieces of sheet metal over the flattened part of the

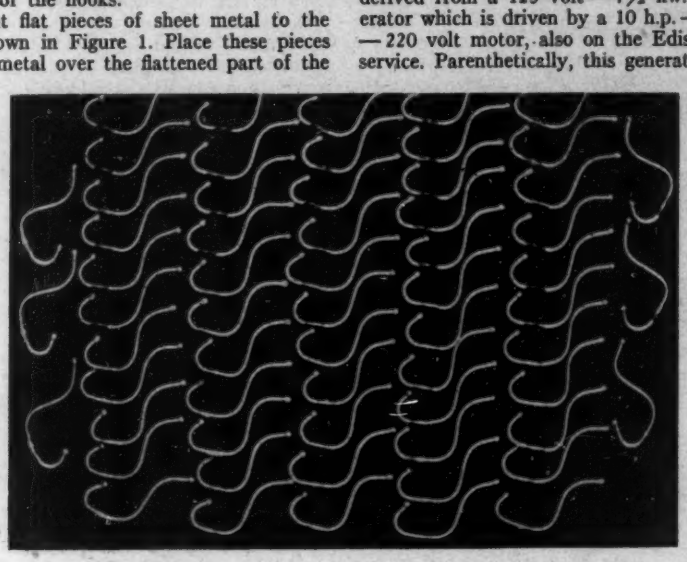

Fig. 2. The finished costumer hooks

hooks properly centered, and using a tinner's ⅜-in. seaming tool and hammer, drive the sheet metal down over the flattened part of the rods, flush with the back part of the hooks. If the regular seaming tool is too wide, make a seaming tool that will exactly fit the flattened part.

Center punch center of the flattened piece and drill a ⅛-in. hole through the sheet metal and through the flattened part of the hook. Then countersink the hole slightly from the back side of the hook. Insert round-headed rivet on front side of sheet metal flange and rivet on reverse side. The rivet must not extend much beyond the flattened part of hook. The back part of the flange must be kept flush with the hook. Drill two 3/16-in. screw holes on each side of raised seam for fastening to the costumer.

The finished hook is then filed smooth removing burrs or rough spots and also using fine emery for the final finish.

The project was finished with powdered nugget gold bronze mixed with banana oil, which gave it a polished brass appearance.

ELECTRICAL TEST BOARD

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Senior High School
San Bernardino, Calif.

A most useful project for students of the school electric shop is the construction of a good electrical test board. It challenges the student's initiative and imagination, and when completed, it becomes one of the more important of the essential electrical tools. It is particularly useful in school shops which specialize in motor and generator rewinding, and in appliance maintenance and repair.

In designing the board shown in Figure 1, the electric-shop students of San Bernardino High School decided to incorporate the use of all possible voltages and amperages, within the limits of their respective power sources. These sources include a.c. voltages up to 220 volts, and d.c. voltages up to 125 volts. The former is that of the usual commercial light and power service, provided by the Southern California Edison Co. The latter is that derived from a 125 volt — 7½ kw. d.c. generator which is driven by a 10 h.p. — 3 phase — 220 volt motor, also on the Edison power service. Parenthetically, this generator, which was a casuality of the 1938 flood, was buried under river sand for several months. It was eventually dug up and, because of its hopeless condition, was presented to the school. The electric shop students cleaned and rewound it, and now have a very excellent motor-generator set.

After much controversy among the students it was decided that, to get the best possible power use and effectiveness, the test board should incorporate six separate test panels. They are (from left to right in Figure 1):

1. Variable a.c. voltage panel
2. 220- and 110-volt continuity test panel
3. Growler panel
4. A.c. lamp bank panel
5. D.c. lamp bank panel
6. D.c. resistor panel

In arranging panel No. 1 (Variable a.c. voltage panel), a one half kva transformer, whose primary operates on 120 volts, was wound by the students. Six taps were taken from the secondary and brought out to numbered jacks on the lower face of the panel. Two six-foot rubber cords, with plugs to fit the jacks on one end and heavy 25-ampere test clips on the other, were made and permanently attached to the board. By inserting the two plugs into a preselected pair of jacks on the board, any voltage, varying in steps from 3 to 50, could be impressed upon the test clips. A table, indicating the voltages obtained from any pair of jacks, is painted at the top of the panel, which is completed by the addition of a main panel switch, a voltmeter and a voltmeter switch. The variation in voltage, provided by this panel, has been invaluable in the testing of low voltage apparatus, particularly tubes of various kinds, homemade appliances, toys, and the like.

Panel No. 2 (220- and 110-volt continuity test panel) is the usual continuity tester, including light bulbs in series with test prongs. In the present panel, the wiring is such that, in addition to the main panel switch, a selector switch is used to direct the current from the 220-volt source through two 110-volt bulbs in series with the test prongs, or from the 110-volt source through one 110-volt bulb in series with the prongs, as wished. This is a desirable feature where breakdown voltages greater than 110 volts is needed. The number of uses to which this panel can be put, is limitless in the testing of practically all types of electrical apparatus, machines, and equipment.

Panel No. 3 (Growler panel) comprises a main panel switch, a pilot light to indicate operation, and a growler. The growler itself was made from built-up transformer iron, and wound on one of the shop lathes. Its main use is the testing of motor armatures, and other wound parts.

Fig. 1. The electrical test board

Panels Nos. 4 and 5 (a.c. and d.c. lamp bank panels) are similar in their arrangements (if not in their uses), and incorporate voltmeters and ammeters in both the a.c. (left No. 4) panel and the d.c. (right No. 5) panel. The instruments in all cases are connected across, or in series with the load, not the source. Both panels feed through the lamp bank (18 60-watt bulbs) to the jacks immediately below, and are controlled by two selector switches immediately above. The top selector switch (a 3-pole DT) selects between a.c. and d.c. The bottom selector switch (a DPDT) selects between 220 volts a.c. and 110 volts a.c. when the upper switch is set for a.c., or between 125 volts d.c. and nothing

when the upper switch is set for d.c. These two panels, therefore, impress upon the two common jacks at the bottom, voltages up to 220 volts a.c. or up to 125 volts d.c., and amperages up to about nine amperes, either a.c. or d.c. When the selector switch is set for a.c. operation, current control to devices under test is extremely convenient and accurate. When set to d.c. operation, tests of rewound motor polarity, magnetic equipment and the like, may easily be controlled.

The final panel No. 6 (d.c. resistor panel) delivers d.c. current at 125 volts through, either a light bulb for continuity and polarity testing, or through a variable resistor to the jacks at the bottom of the panel. Quick changes in d.c. current control, by the resistor panel, are highly desirable, as contrasted with the control provided by the d.c. lamp bank panel, which is much slower.

THE TUSCHE STENCIL METHOD

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New York School of Industrial Art
New York City

There was a time when only the commercial phase of silk-screen process was known; when this form of printing was confined to signs, commercial posters, pennants, and other such uses. That the silk-screen process could be a creative art medium was first recognized by a small group of men and women who were primarily artists and print makers, not industrial printers. Their enthusiastic experimentation with the process and the silk-screen prints which eventually found their way into art galleries opened new vistas for the creative artist looking for new ways of turning out art prints in quantity.

The uninhibited use of color, the inexpensive equipment, the ease with which stencils can be made and prints produced, and the unusual flexibility of this printing medium explain why silk-screen printing is fast becoming a popular graphic art.

Of all the methods that the experimenters worked with, the tusche stencil method best fulfilled their artistic intentions. The use of tusche is nothing new in the field of commercial or fine art printing; it has been used by lithographers since Senefelder's day. Its application to silk screen therefore, was a transition of skill easily made by print makers to whom lithography was one of the tools of the trade.

Tusche can be applied in liquid or crayon form. The stencil artist paints his design directly on the silk and may improvise as he proceeds with the work to build up his design as he would in doing an original painting on board or canvas. Tusche does not "cramp the artist's style." It is a method which responds sympathetically to the artist's habits of painting or drawing. A print produced with a tusche stencil will have the "accidentals" and will retain the personality of the craftsman much the same as a woodcut print, an etching, or a lithograph. Its main limitation is that the lines of the print are not sharp, but, of course, to the artist the lack of mechanical precision is to put it mildly, no lamentable loss.

If you're interested in obtaining artistic effects by silk screen and would like to try the tusche method, you have only to augment your regular silk-screen unit with the following materials:

Cornstarch. Kitchen variety cornstarch, when diluted with water, is used as an initial sizing to temporarily close up the mesh of the silk so that the design to be tusched in will have a good foundation.

Korn's Tusche. This is a black fluid used to paint the design on the screen. It comes in two forms: as a liquid or a crayon. The liquid is for use with a brush mostly to get solid effects, while the crayon stick is used to get gradations of tone by rubbing it with varying pressure directly on the silk.

Glue. LePage's liquid glue is recommended. When properly diluted with water, the glue is used as a coating substance for the screen.

Fig. 1. Setting the original into the register guides

When dry, the glue forms a durable-but-resilient film and forms the substance of the stencil.

Procedure

1. Center your original design under the screen. Fix the guides as usual and lower the screen. See Figure 1.*

2. With a well-sharpened pencil or with pen and ink make a complete key tracing of the design on the silk, as shown in Figure 2. When new, the silk is sufficiently transparent for the original to be clearly discernible. Be

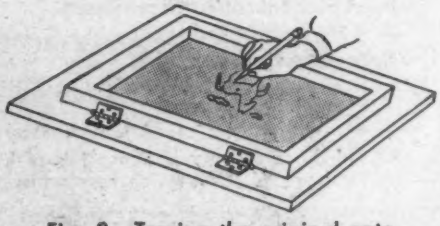


Fig. 2. Tracing the original onto the silk

sure you have on the silk all of the lines that comprise the boundaries of the component areas of the design you are reproducing.

3. Remove the pushpins from the hinges, thus disattaching the screen from the base. Now place the screen on the base upside down so that the silk faces up.

4. Prepare the starch-water sizing by mixing about two tablespoons of cornstarch with a glassful of water. Mix thoroughly until you obtain a milk-white solution. With the aid of a sponge or large wad of absorbent cotton, saturate the silk with this solution. See Figure

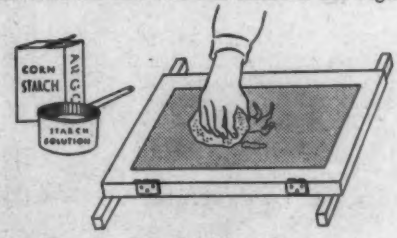


Fig. 3. Starch-sizing the screen

*All illustrations used in this article are from *Silk-Screen Stenciling as a Fine Art* by J. I. Biegeleisen, published by McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y.

3. The sizing should not be applied to that side of the silk bearing the design, as the application of the liquid would only wash off the line tracing from the screen.

5. Allow the starch sizing to dry. You will find that as it dries, it takes on a whitish color and becomes slightly powdery to the feel.

6. Re-engage the frame to the hinges so that the screen is in the same position it held during the tracing.

7. Pour a little tusche into a small container and using an artist's or lettering brush, paint in the areas that appear in line or solids, as shown in Figure 4. Use any painting technique to which you are accustomed and which will most sympathetically bring out the effect you are trying to get. You may use stipple, dry-brush, crosshatching, etc.

To get a gradation of tone, use the tusche crayon. Your tusched-in area on the screen will give you a preview of the general effect of the design you can expect in the print.

8. Allow twenty minutes or so for the tusche to set before you proceed with the next step in the making of a tusche stencil.

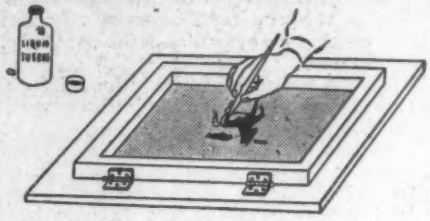


Fig. 4. Tusching in the design

9. Mix up a water-glue solution in a 50-50 proportion. Half a glass of this solution should be more than ample to cover the average screen.

10. Pour a quantity of the water-glue mixture inside the screen along one of the sides of the frame. With the aid of a clean-cut scrap of stiff cardboard, scrape the glue across the entire screen. See Figure 5. Do this as evenly as possible, and to be sure that the tusche and all of the silk is completely covered with glue, you may give it another even scraping when the first coating has set.

11. Allow the glue to dry hard. This may take about an hour in which time you may be engaged in mixing the colors, getting the squeegee set, and other such chores.

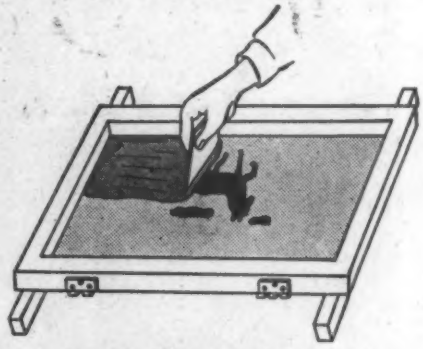


Fig. 5. Gluing in the screen

12. Now raise the screen and with a rag well saturated with kerosene or turpentine, rub over the entire screen concentrating mainly on the tusched-in design. See Figure 6. The object of this is to dissolve the tusche. The glue will not be affected by the kerosene. After a few minutes of this kerosene soaking and rubbing, the tusche will loosen up and

take with it as it dissolves, any glue which may be attached to it as well as the starch sizing. To completely eliminate the tusche, give the upper side of the screen the kerosene treatment also, after having saturated the underside of the silk as directed. This will completely dissolve and wash away all tusched areas.

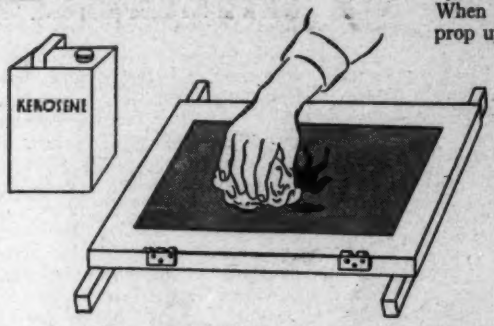


Fig. 6. Dissolving the tusche

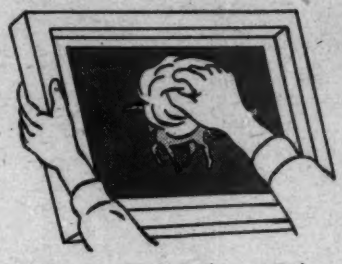


Fig. 7. Drying the stencil

13. Dry both sides of the screen thoroughly with an absorbent cloth, removing all traces of kerosene, and any possible residue of tusche. See Figure 7.

14. The stencil is then ready for paint and squeegee and you can proceed with the printing at once.

A stencil made with the tusche-resist method will last for several thousand prints before the first symptoms of breaking down occur. In editions which go well beyond two thousand impressions, tiny pinholes may appear in the print as a result of little openings in the glue coating, created by the repeated pressure of the squeegee to and fro. These pinholes may be closed up by placing small pieces of scotch tape on the underside of the silk directly over the leaks. Or better still, by applying dabs of glue to the open spots.

Any type of silk-screen printing medium may be squeegeed through a tusche stencil except water tempera colors or water dyes, which obviously would dissolve the glue of which the stencil is in reality composed. Tusche stencils may be saved for re-use. Should a stencil not be required for another edition, the glue may be cleaned off readily with water.

Some artists dispense with the starch sizing and work directly on the raw silk, without benefit of any tracing. In this case, the procedure is simplified. The results are marked by a coarser line and a rougher texture. When doing it this way, it is necessary to prop up the screen so that the tusche will not run through the silk and mar the original on the base.

Many special effects are possible with the tusche method that are not possible with some of the other stencil methods described in this series. Not only can one simulate drybrush and other known techniques, but by clever working of the crayon over assorted surfaces such as sandpaper, wire mesh, and rough textured cloth or leather, one may obtain clever effects that further broaden the scope of a process intrinsically versatile.

ORNAMENTAL TIN CRAFT

CHRIS H. GRONEMAN

Industrial Education Department
A. & M. College of Texas
College Station, Tex.

(Continued from page 417 of the November, 1945, issue)

Candy Tray

The candy tray shown in figure 1 is both useful and pretty. It is not an easy project to make but it entails valuable experience in forming, both for depth and rim design. The sizes specified are purely optional and can be altered to suit the individual preference of the craftsman. It should be remembered that the size of the rim should be increased proportionately with the size of the tray.

Fig. 1. Candy tray

The unusual shape of the rim can be obtained by cutting the desired groove in a flat block of wood and forming the rim into the groove with a wooden art-metal mallet. The tray or bowl portion can be made with a ball-peen hammer over a forming block.

This particular tray has proved to be one of the most popular projects for students and craftsmen. Its attractiveness can be improved by varying the size of peening in the tray and with that of the rim. Figure 1 shows the effectiveness of this contrast.

This project should be made of two pieces of sheet tin, sweat-soldered together. The design of the rim may be varied by making more flutes or by piercing. It is advisable to cement a piece of felt or other suitable fabric on the base of the tray so that well-finished table or desk tops will not become marred.

BILL OF MATERIALS

No. of Pcs.	*Item*	*Size*
2	Sheet tin	8½ x 8½
	Felt	5 in. in diameter
	Solder, flux, steel wool, glue or cement for holding felt	

Tools:

Asbestos sheet, brush, carbon paper, copper-plating setup, emery cloth, file, flat iron, forming block, heating device, jeweler's frame and blade, lead or wood block, lead weight, peening hammer, pencil, rule, scriber, soldering copper, tempera water color paint — yellow, and tin snips.

Procedure:

1. Use the design shown in Figure 2, or develop an original design.
2. Cut out 2 pieces of tin stock.
3. Solder one side of each piece.
4. Sweat both pieces together with hot flat iron. Weight the soldered parts together immediately as more is sweated.
5. Apply a coat of yellow tempera water paint to one side of the sweated piece for design transfer.
6. Lay design sheet and carbon paper over painted portion and trace design.
7. Cut out the outer design of tray with tin snips.
8. File and dress edges with emery cloth.
9. Form center portion of tray over forming block to the depth desired.
10. Perform necessary forming or fluting of rim over special grooved block.
11. Peen exposed surfaces of rim on lead or wood block.
12. Rub candy tray with steel wool and prepare for plating.
13. Apply thick coating of copper.
14. Polish with steel wool, using cloth to prevent touching metal with hands.
15. Apply coat of clear metal lacquer and allow to dry.

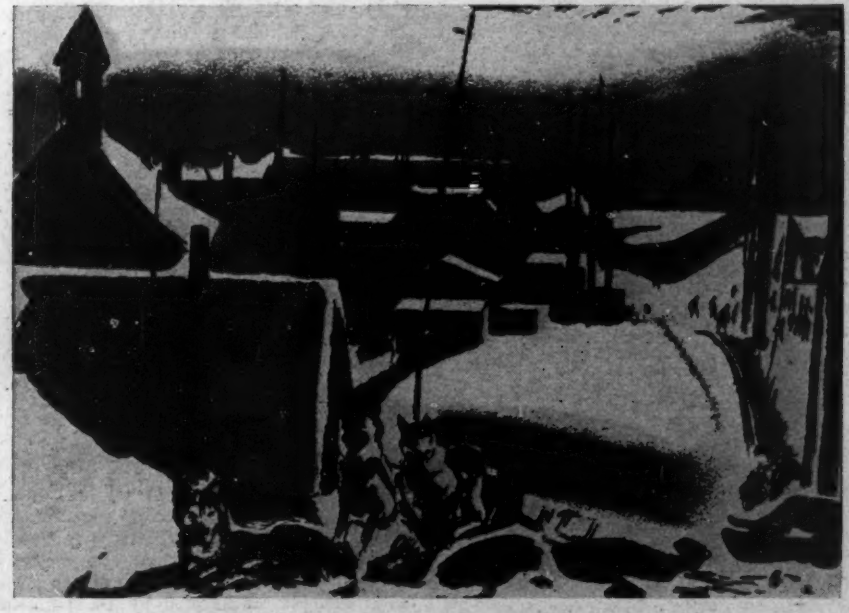


Fig. 8. An example of the tusche process

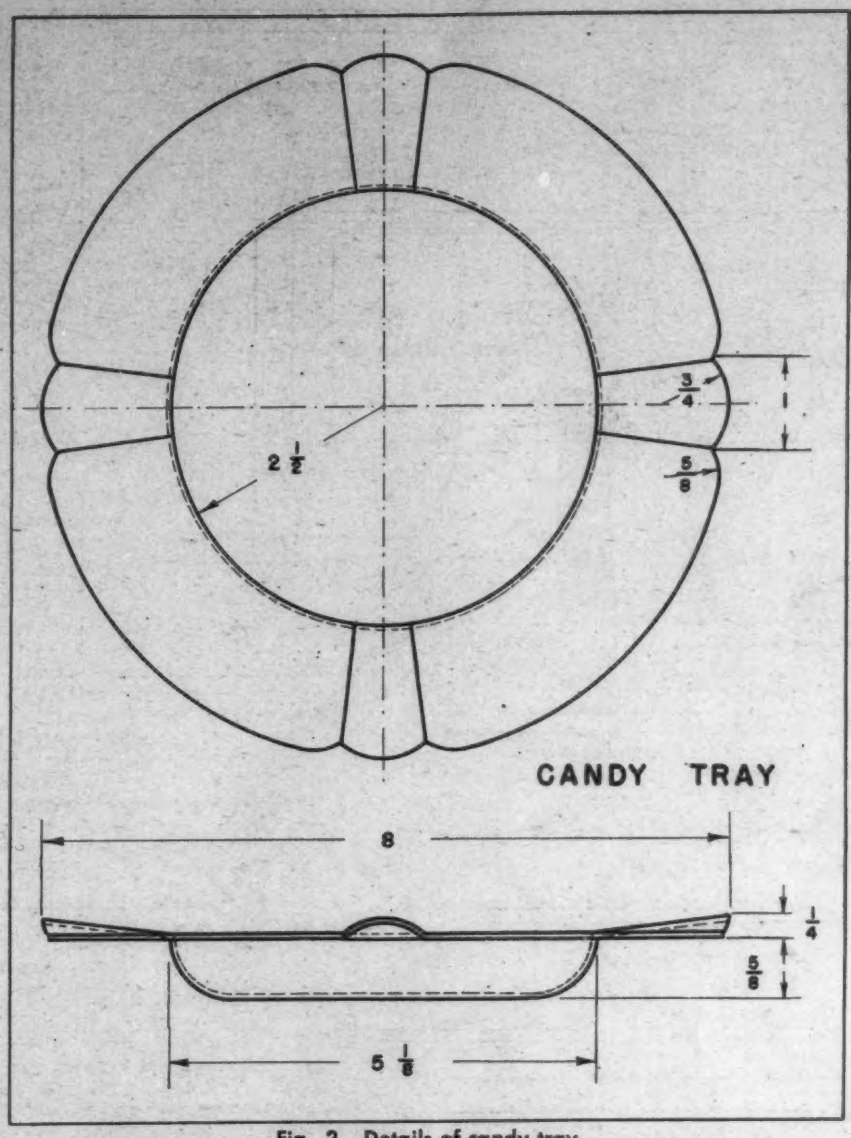


Fig. 2. Details of candy tray

BICYCLE WRENCH

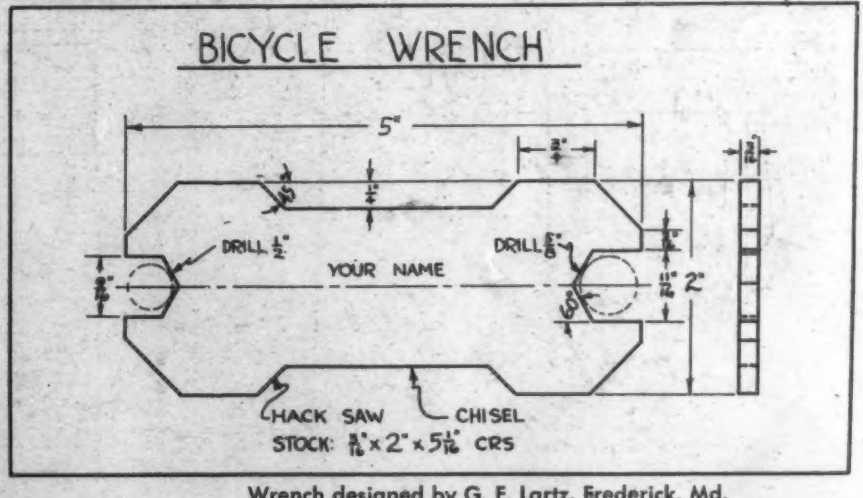
GEORGE F. LARTZ

High School
Frederick, Md.

A project that appeals to the boy is this handy pocket wrench which fits the front and rear axle nuts of the ordinary bicycle. Made from 3/16 by 2-in. cold rolled steel highly polished, this is a job which a boy with a bike will prize. Care must be taken to file the openings so that the nuts will fit snug as too much play will chew the sides of the wrench as well as the bicycle part. As indicated by the dotted lines a 5/16-in. hole is drilled through the 11/16-in. layout, while a ½-in. hole is drilled through the 9/16-in. layout to facilitate filing. This project has been a favorite with the ninth-grade students in the general metals classes at the school for the past two years. The following general steps are used in the making of the project.

1. Get out stock.
2. Draw file one side.
3. Coat steel with layout fluid and make layout from drawing.
4. Center punch and drill ½ and 5/8-in. holes in the 9/16 and 11/16-in. openings respectively.
5. File openings to size (Note: A test set of bicycle nuts is welded on a 3-in. ring and kept in the toolroom for fitting.)
6. Hack saw all 45-deg. angles outside layout lines.
7. With wrench in vise, shear waste stock with cold chisel.
8. Draw file all surfaces and stamp your initials or name on the wrench.
9. The wrench may be casehardened, although using it *as is* proves satisfactory.
10. Polish overall.
11. Turn in for instructor's inspection.

Fig. 1. Bicycle wrench



Wrench designed by G. F. Lartz, Frederick, Md.

TEN-INCH BENCH SAW

WILLIAM A. DE VETTE

Technical High School
Erie, Pa.

The bench saw of the home workshop variety is so in demand that it may well be used as a project in mass production in machine shop classes and may be retained as a standard project year after year. The usual saws found on the market are a little too small in capacity for most home workshops while the larger saws are too high in price for the average hobbyist. The saw in the accompanying illustration has been selling for years from our school shops for $25 to $28. It uses a 10-in. blade and is suitable for dado and rabbet work as it can be used for cutting grooves up to ¾ in. wide at one cut.

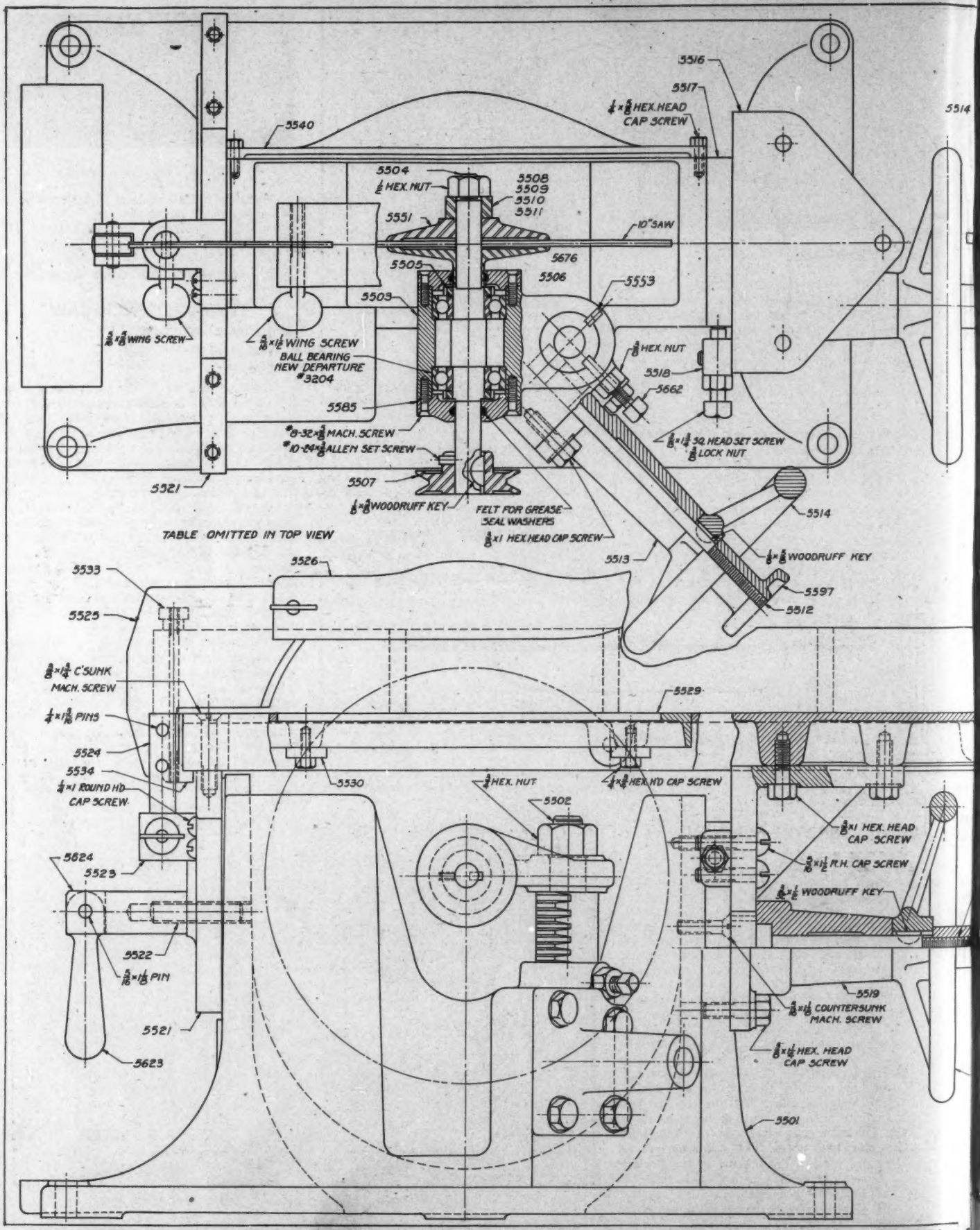
This saw is intended as an advanced project in vocational classes and is not suitable for prevocational classes.

The project as a whole presents a wide variety of work for the drafting classes, the pattern shop classes, and the school machine shop.

The complete saw is shown in a working assembly together with the parts and stock list, and six detailed drawings. The details are and will be shown as dimensioned perspectives which may be used as drafting problems either individually, or collectively as a squad project.

There are a sufficient number of details of varying degrees of difficulty to meet the wide

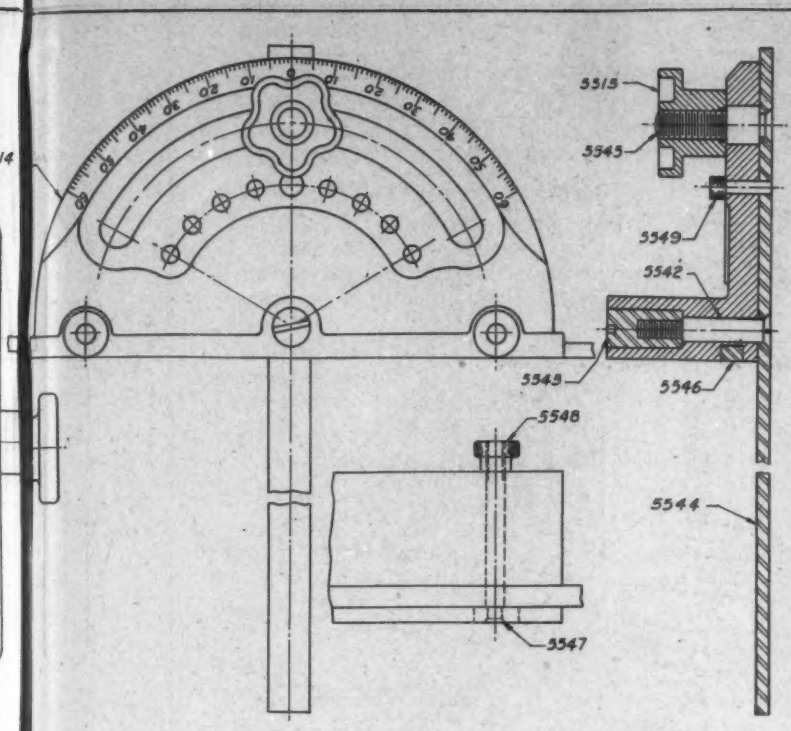
(Continued on page 465. Assembly and details on pages 460–464.)



Assembly of

0-inch be

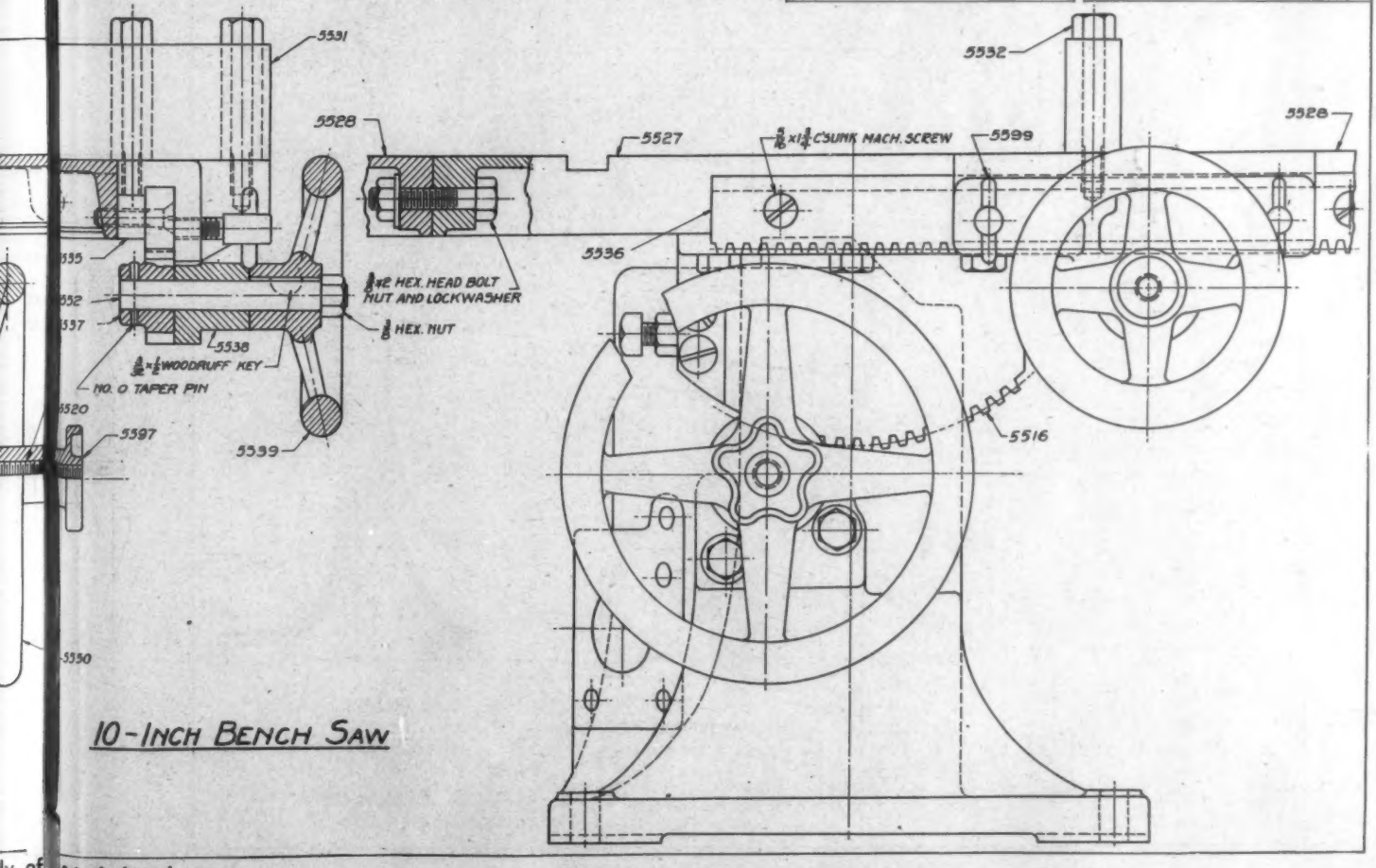
10-



PART	NAME	MAT.	REQ.
5545	CUT-OFF ATT. CLAMP STUD	M.S.	1
5546	" " ", LENGTH GAGE	C.R.S.	1
5547	" " " GAGE CLAMP SCW	M.S.	2
5548	" " " CLAMP NUT	M.S.	2
5549	INDEX PIN	C.R.S.	1
5550	TABLE TILTING HANDWHEEL	C.I.	1
5551	SAW COLLAR (OUTSIDE)	M.S.	1
5552	RIPPING FENCE PINION SHAFT	C.R.S.	1
5553	GIB KEY	M.S.	1
5585	GREASE SEAL WASHER	C.I.	1
5597	LARGE HAND NUT	C.I.	2
5599	RIPPING FENCE CAR. LOCK NUT	C.R.S.	2
5623	HANDLE FOR LOCK NUT	C.R.S.	1
5624	TABLE TILTING LOCK NUT	C.R.S.	1
5676	SAW COLLAR (INSIDE)	M.S.	1
5662	ELEVATING RACK SCREW	M.S.	1

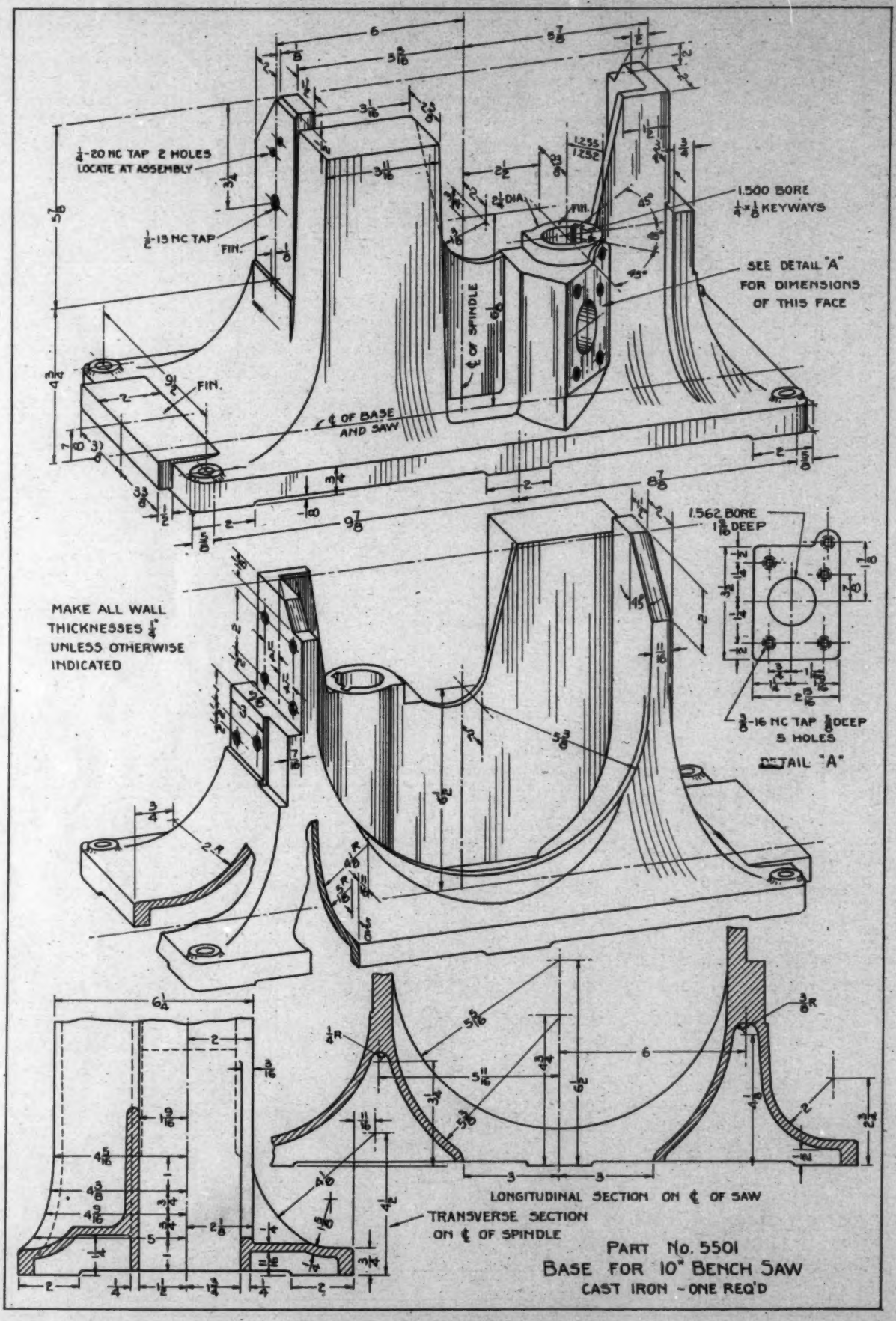
1/4 HEX. NUT	5502	1
1/2 HEX. NUT	5504	2
1/8 x 3/8 WOODRUFF KEY	5004	3
#10-24 x 3/8 ALLEN SET SCREW	5507	1
3/8 x 1 HEX. HEAD CAP SCREW	5513	7
5/16 x 1 1/2 ROUND HEAD CAP SCREW	5516	6
3/8 x 1 3/4 SQ. HD SET SCREW-LOCK NUT	5518	1
3/8 x 1 1/4 HEX. HEAD CAP SCREW	5519	2
5/16 x 3/8 WING SCREW	5523	1
1/4 x 1 ROUND HEAD CAP SCREW	5523	2
5/16 x 1/4 PIN	5624	1
1/4 x 1 3/16 PIN	5524	2
5/16 x 1 1/2 WING SCREW	5626	1
1/4 x 3/4 HEX. HEAD CAP SCREW	5527	4
3/8 x 1 1/4 C'SUNK MACH. SCREW	5527	4
5/16 x 1 1/2 C'SUNK MACH. SCREW	5517	4
3/8 x 2 HEX. HEAD BOLT-LOCK WASHER	5528	6
5/16 x 1 3/4 C'SUNK MACH. SCREW	5526	4
#0 TAPER PIN	5537	1
3/8 HEX. NUT	5552	2
3/32 x 1/2 WOODRUFF KEY	5552	1
#8-32 x 3/8 MACH. SCREW	5585	4
FELT FOR GREASE SEAL WASHER	5506	2
BALL BEARING--NEW DEP. 3204	5503	2

PART	NAME	MAT.	REQ.
5501	BASE	C.I.	1
5502	SPINDLE ELEVATING RACK	M.S.	1
5503	" BEARING BRACKET	C.I.	1
5504	SPINDLE	T.S.	1
5505	BALL BRG. LOCK WASHER	M.S.	2
5506	GREASE SEAL WASHER	C.I.	1
5507	SPINDLE PULLEY	M.S.	1
5508	SPACING COLLAR	M.S.	1
5509	" "	M.S.	1
5510	" "	M.S.	1
5511	" "	M.S.	1
5512	SPINDLE ELEVATING PINION	M.S.	1
5513	" " BRACKET	C.I.	1
5514	" " H'DWHEEL	C.I.	1
5515	SMALL HAND NUT	C.I.	1
5516	TABLE TILTING BRACKET	C.I.	1
5517	" " GUIDE PLATE	M.S.	1
5518	" STOP ADJUSTG BLOCK	M.S.	1
5519	" TILTING PINION HOUSING	C.I.	1
5520	" " PINION	M.S.	1
5521	" CLAMPING BRACKET	C.I.	1
5522	" " STUD	C.R.S.	1
5523	SAW GUARD BRACKET	C.I.	1
5524	" " POST	C.R.S.	1
5525	" " PLATE	M.S.	1
5526	" GUARD	AL.	1
5527	" TABLE	C.I.	1
5528	" " EXTENSION	C.I.	2
5529	REMOVEABLE TABLE PLATE	C.I.	1
5530	TABLE PLATE WASHER	M.S.	4
5531	RIPPING FENCE	C.I.	1
5532	" " SHOULDERSCW	M.S.	2
5533	" " CLAMP SCREW	M.S.	1
5534	" " CLAMP	M.S.	1
5535	" " SPACER	M.S.	1
5536	" " RACK	M.S.	1
5537	" " PINION	M.S.	1
5538	" " CARRIAGE	C.I.	1
5539	" " HANDWHEEL	C.I.	1
5540	COVER PLATE	C.I.	1
5541	CUT-OFF ATTACHMENT BASE	M.S.	1
5542	" " " SWIVEL SCW	M.S.	1
5543	" " " " NUT	M.S.	1
5544	" " " GUIDE	C.R.S.	1

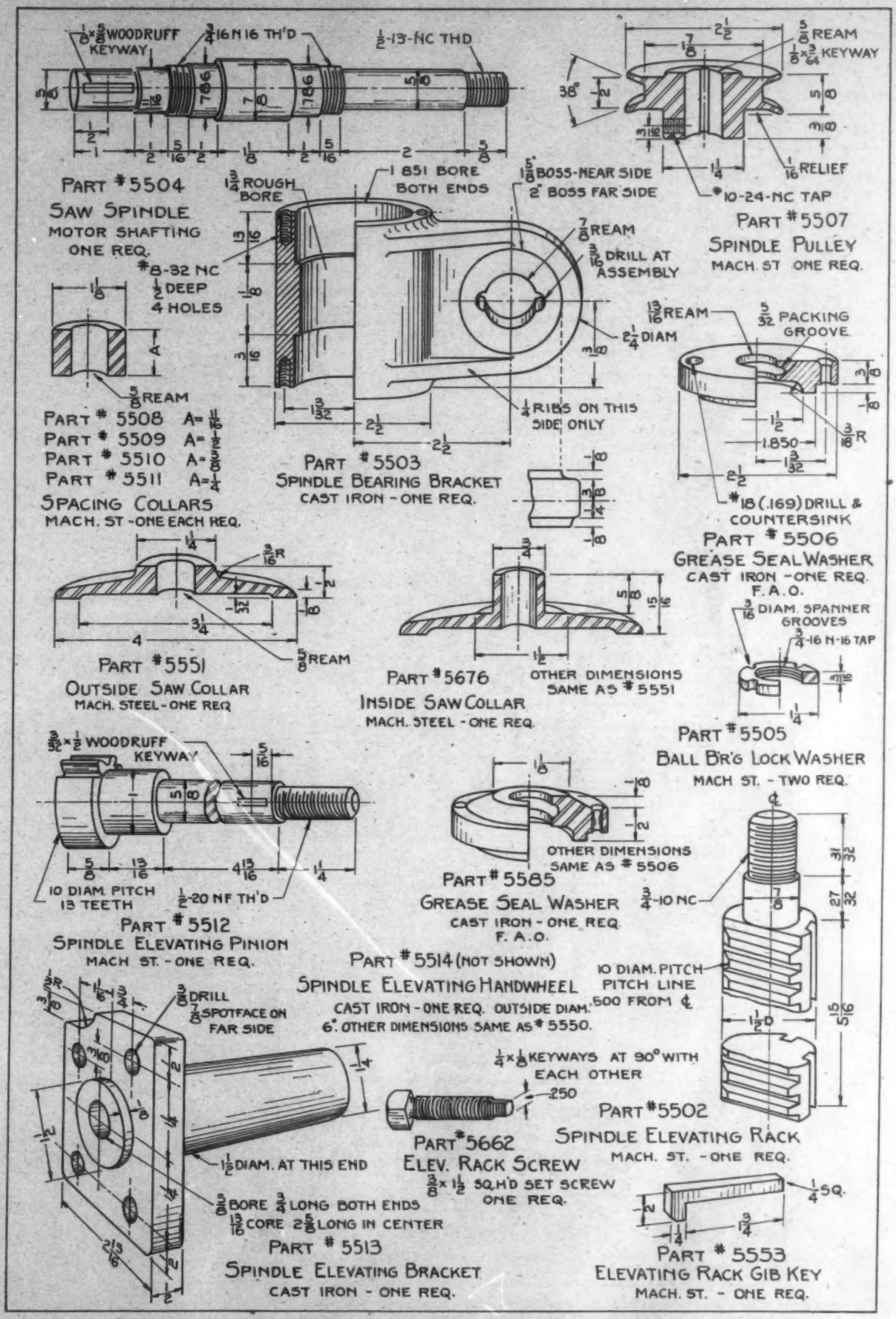


10-Inch Bench Saw

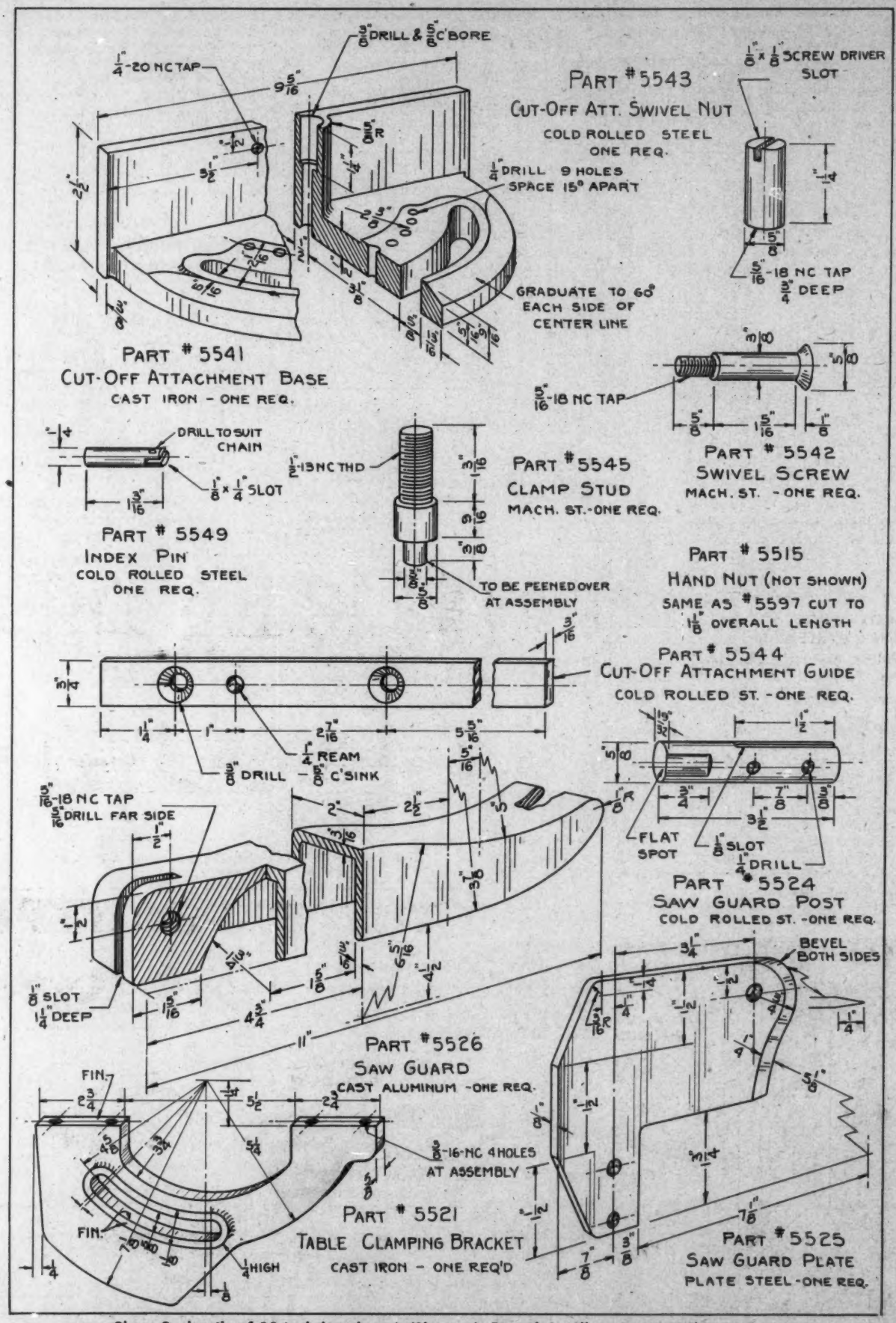
0-inch bench saw


1/4-20 NC TAP 2 HOLES LOCATE AT ASSEMBLY
1/2-13 NC TAP FIN.
1.500 BORE 1/4 x 1/8 KEYWAYS
SEE DETAIL "A" FOR DIMENSIONS OF THIS FACE
℄ OF SPINDLE
℄ OF BASE AND SAW
FIN.
MAKE ALL WALL THICKNESSES 1/4" UNLESS OTHERWISE INDICATED
1.562 BORE 1 1/16 DEEP
3/8-16 NC TAP 3/8 DEEP 5 HOLES
DETAIL "A"
LONGITUDINAL SECTION ON ℄ OF SAW
TRANSVERSE SECTION ON ℄ OF SPINDLE
PART No. 5501
BASE FOR 10" BENCH SAW
CAST IRON - ONE REQ'D

Sheet 1, details of 10-inch bench saw



Sheet 2, details of 10-inch bench saw



Sheet 3, details of 10-inch bench saw (Sheets 4, 5, and 6 will appear in a later issue)

(Continued from page 459)

range of individual abilities encountered in the average class. When used as a class project the importance of the relation of one part to another will add interest to the drawings. The students in checking their drawings against those with which their own parts come in contact will get a greater knowledge than they would receive from individual exercise jobs.

The knowledge that their drawings will be used by their friends in patternmaking and machine-shop classes will add to their interest and to their desire to have them as correct as possible.

It is suggested that the shop make one saw as a starter and that both pattern and machine shops be furnished with a master set of blueprints for the purpose of noting corrections and changes. There is no doubt that if the instructor were to take the time to give the drawings a thorough check of commercial caliber he would not have much time left to teach. However, by co-operation with the drafting room the shops will be assured of a good set of drawings by the time the first machine has been completed.

As a suggestion to the machine-shop instructor, it is recommended that the three sections of the table be bolted together before the final machining on the table top is done. Extra care should be taken that the saw and ripping fence are made parallel and the face of the cutoff attachment be truly perpendicular to the saw blade.

SNIFF TEST

EVARETT I. RUSS and SIMON S. PALESTRANT

William H. Taft High School
New York City

Pupil familiarity with shop liquids can be greatly improved with the use of the sniff test described herewith. No longer need alcohol be mistaken for turpentine, or acetone for either of the two.

A test tube rack may be made in any size and with any number of holes, to accommodate the number and size of tubes for which you have liquids.

The pupils should be encouraged to test their nose and knowledge against this test. If formal tests are given, only a perfect score should be considered passing, as complete familiarity is the only safeguard against mistakes. The authors have used this device with a check list upon which the pupils checked themselves when their familiarity with the liquids was perfect. The results were completely successful.

The liquids used in the illustrated rack were alcohol, turpentine, acetone, shellac, and varnish, but any variety may be used to suit your purpose.

Testing by the sense of smell

AN EXPLANATION OF POINT SIZE IN TYPE

LIEUT. CMDR. R. RANDOLPH KARCH, U.S.N.R.

Training Literature Field Unit No. 1
New York City

Body sizes of type are designated in points. A point is roughly 1/72 of an inch. The point measure actually used in manufacturing foundry type is .0138 of an inch; for machine-cast type it is .014 of an inch.

The point sizes of type mean little without considering the *design* of a type face. For example and as illustrated in Figure 1, a 60-point cap letter may be very slightly less than 60 points, or it may be as small as 42 points. A reasonably full-sized 60-point character is Agency Gothic as shown at the extreme left in Figure 1. This size is possible because this font of type has no descenders; hence needs no shoulder at the bottom. A small-sized character on the 60-point body is shown at extreme right, in Garamond Bold. Note the difference in the same 60-point size between the lower-case "g" of Coronet and the lower-case "g" of Century Expanded — yet *both* are 60-point type sizes.

The readability of any type face is dependent upon its design and size. Factors of readability are:

1. Width of the type face. Boldness does not always mean *readability* — often only *visibility*.
2. Width of characters. Generally speaking, the more narrow the type face, the less readable it is.
3. Height of lower case.
4. Leading between lines. Most type becomes more readable by adding space between lines. Too much leading loses this advantage.

Figure 2 presents the first three factors. Figures 3 and 4 show a representative selection of type faces arranged in order of their height of caps and lower case. All are 14-point size, blown up photographically for ease in examination.

A usual series of type sizes includes: 6, 8, 10, 12, 14, 18, 24, 30, 36, 42, 60, and 72 point. Other odd sizes are often added to a family: 4, 5, 5½, 6½, 7, 7½, 9, 10½, 11, 11½, 16, 28, 34, 54, 84, 96, 120, and 144 point. Many of these sizes are relatively rare, and made for special purposes.

Fig. 1. This cut is reduced to about 80 per cent of original size

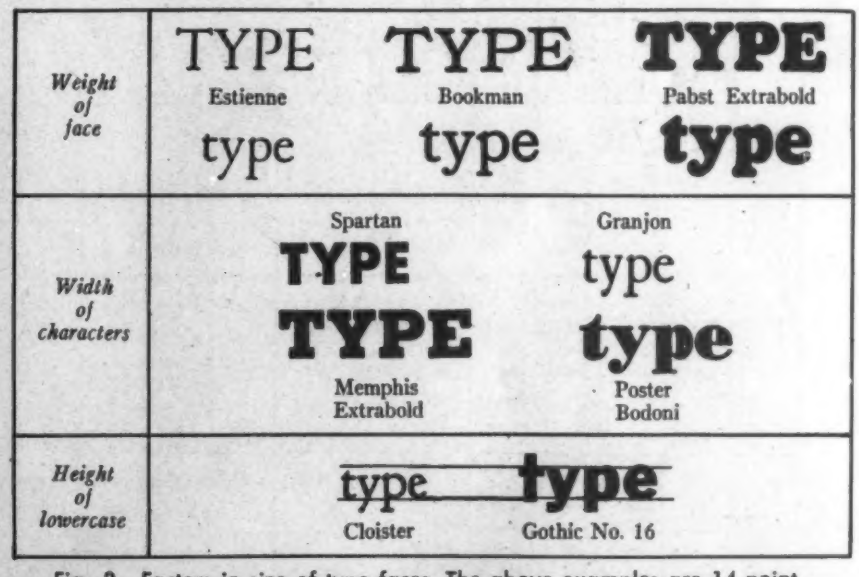


Fig. 2. Factors in size of type faces. The above examples are 14 point, blown up

Smallest	*Smaller than Average*	*Average*	*Larger than Average*	*Largest*
TYPE Cloister	TYPE Caslon Old Face	TYPE Baskerville	TYPE DeVinne	TYPE Caslon
TYPE Cloister Wide	TYPE Estienne	TYPE Baskerville Bold	TYPE Fairfield	TYPE Caslon No. 3
TYPE Cloister Bold	TYPE Garamond	TYPE Bodoni	TYPE Janson	TYPE Century Bold
TYPE Garamond No. 3	TYPE Garamond Bold	TYPE Bodoni Bold		TYPE Century Expanded
TYPE Garamond Bold No. 3	TYPE Granjon	TYPE Bodoni Book		TYPE Cheltenham
	TYPE Sparton Black	TYPE Bookman		TYPE Cheltenham Bold
		TYPE Caledonia		TYPE Cheltenham Wide
		TYPE Excelsior		TYPE Electra
				TYPE Elzevir No. 3
				TYPE Gothic No. 13
				TYPE Gothic No. 16
				TYPE Memphis Extrabold
				TYPE Memphis Medium
				TYPE Metroblack
				TYPE Metrolite
				TYPE Pabst Extrabold
				TYPE Scotch

Varying Heights of Cap Letters of the Same Point Size

Samples are 14 point blown up for ease in examination. Face heights are arranged from smallest to largest in columns from left to right.

Note also variations in weight and design of these popular type faces.

Fig. 3. Varying heights of capital letters

Smallest	*Smaller than Average*	*Average*	*Larger than Average*	*Largest*
type Cloister	type Bodoni	type Caslon	type Caslon No. 3	type Gothic No. 13
type Cloister Wide	type Bodoni Bold	type Baskerville Bold	type Caslon Bold	type Gothic No. 16
	type Caslon Old Face	type Baskerville	type Century Expanded	type Pabst Extrabold
	type Cloister Bold	type Bookman	type DeVinne	
	type Estienne	type Bodoni Book	type Elzevir No. 3	
	type Garamond Bold No. 3	type Caledonia	type Memphis Extrabold	
	type Garamond No. 3	type Cheltenham	type Memphis Medium	
	type Granjon	type Cheltenham Wide	type Metroblack	
		type Cheltenham Bold	type Metrolite	
		type Electra		
		type Excelsior		
		type Fairfield		
		type Garamond		
		type Garamond Bold		
		type Janson		
		type Scotch		
		type Spartan Black		

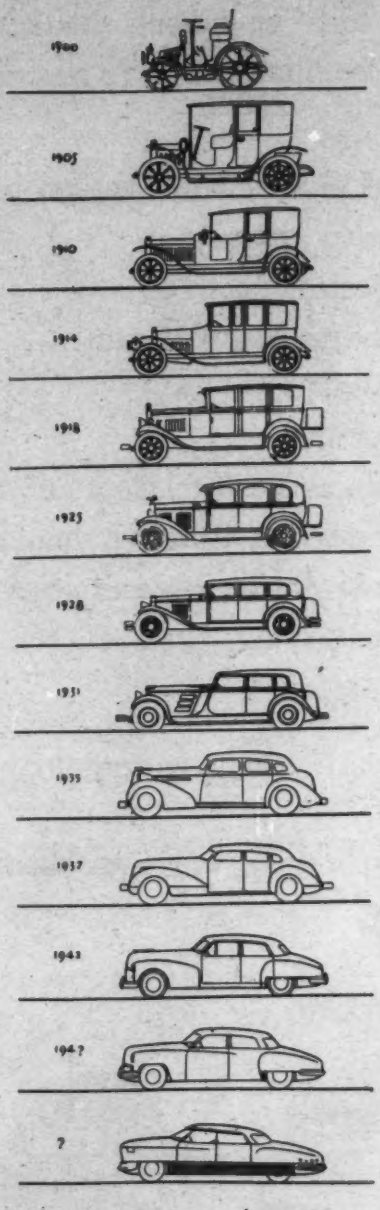
Varying Heights of Lowercase Lettering of the Same Point Size

Samples are 14 point blown up for ease in examination. Face heights are arranged from smallest to largest in columns from left to right.

Ascenders and decenders are not considered.

Fig. 4. Varying heights of lowercase letters

HOW DOES THE DESIGNER ACHIEVE BEAUTY?



Courtesy Raymond Loewy Associates

Perfection of beauty (or the beauty of perfection) may be regarded as the ultimate goal of the constructive designer, regardless of what his product may be. Each designer will have his own concept of what factors contribute to the achievement of beauty. No simple formula can provide an unfailingly successful result, but the following factors, at least, must be considered:

1. Perfection of functions is of first importance.
   a. These must be analyzed.
   b. Materials used must meet demands made on them.
2. All parts of any beautiful object must balance each other.
   a. Analysis must lead to synthesis, with give and take, based on judgment, bringing relative importance of parts or functions into balance.
3. Current social thought and standards affect these decisions.
   a. No design or standard of beauty can be right for all times and places.
   b. Public ideals are apt to lag behind the best informed thought, and seek security in reliance on tradition.
4. Balance and order must be present.

The automobile is an example of the evolution of a design in search of beauty. Its functions include: 1. Carrying passengers, 2. with ever-increasing speed, 3. safely, 4. with easy handling, and, 5. economy of operation. A constant struggle to achieve a balance of these functions (and economy of production) is evident. First one, then another, predominates. The early models seem to hold the horse-drawn carriage as a standard of beauty. Public acceptance of changes usually lags behind knowledge of improvements. Retrogression from standards of beauty often occurs through novelties used to attract sales.

Plate 66. Design course by Burl N. Osburn, director of industrial arts, State Teachers College, Millersville, Pa.

MUST THE DESIGNER CONSIDER ECONOMICS?

The constructive designer cannot set pencil to paper without making or assuming certain economic and social basic conditions which he should understand if he is to work intelligently.

Dunkirk Cup, designed by C.J. Shiner

If he is designing for handicraft production he must expect:

1. Each piece of work is, presumably, a masterpiece.
2. Individuality of design is expected.
3. Some degree of variation from his plans will occur.
4. Duplicating is costly and unnatural.
5. The product of his design is for use.
6. The craftsman, especially when working for himself, cannot afford to waste time, energy, or materials, hence everything he makes must be planned for most effective use, greatest economy of effort in production, and longest use. Hence only the finest of materials should be specified.

When the designer is planning for machine production a different set of conditions will operate to affect his plans:

1. Since the machine is basically a device for duplicating, the design is planned to facilitate exact repetition.
2. Variations, if they occur, are usually defects.
3. The designer probably will have little to do with actual production.
4. Duplicating the article should be expected and usually reduces costs.
5. The product of the machine is for the market (as compared to production for use).
6. The design must be made to allow for a rate of deterioration of the product through wear or style changes, so timed or made obsolete, that continuous production will result. A durable product or a design giving long satisfaction may ultimately lead to unemployment.

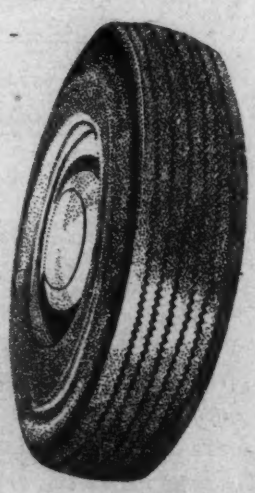


Plate 67. Continuation of design course by Burl N. Osburn, director of industrial arts, State Teachers College, Millersville, Pa.

FOSTERITE

A moisture-proofing plastic has been developed by the Westinghouse research engineers, which flows almost as freely as water, but which on heating hardens permanently to a tough, protective skin.

This new material is named Fosterite, after Newton C. Foster, the research chemist who developed it. The material will be especially useful in the moisture proofing of radio transformers, motors, and other electrical equipment subject to moisture laden atmospheres.

WHITTLING-JACKKNIFE TECHNIQUE

W. BEN. HUNT

Hales Corners, Wis.

(Continued from page 426 of the November, 1945, issue)

Miniature Decoy Ducks

The miniature decoy ducks shown in Figures 192, 193, 194, and 195, not only look well on the whatnot shelf, but they also may be used for paper weights.

White pine or basswood 1¼ in. thick is the right size and kind of material to use for whittling them. The three ducks shown have been chosen because they are the types commonly used as decoys by duck hunters.

The colors are indicated on the full-size patterns but it is suggested that the whittler refer to some bird book with colored illustrations to get correct shades. Decoy ducks are usually painted in bold masses without the delicate shading generally used in finishing.

The simplest way to whittle the ducks is to first cut out the silhouette. Some whittlers will, no doubt, saw the top view outline also, but since these ducks are so small, it only takes a few minutes to block them out. The edges are then cut away after which they are ready for rounding and finishing with sandpaper. A flat single-cut mill file will be found excellent for smoothing up the bodies before sanding.

If these ducks are to be used for paper

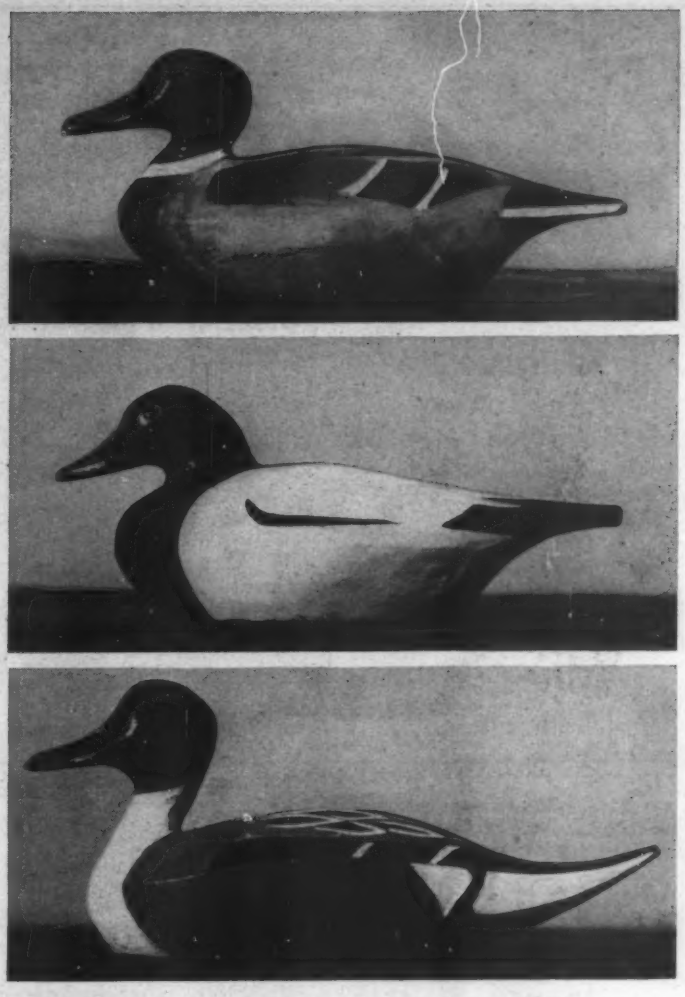


Fig. 192. Miniature decoy ducks. Top, mallard drake; center, canvasback drake; bottom, pintail drake

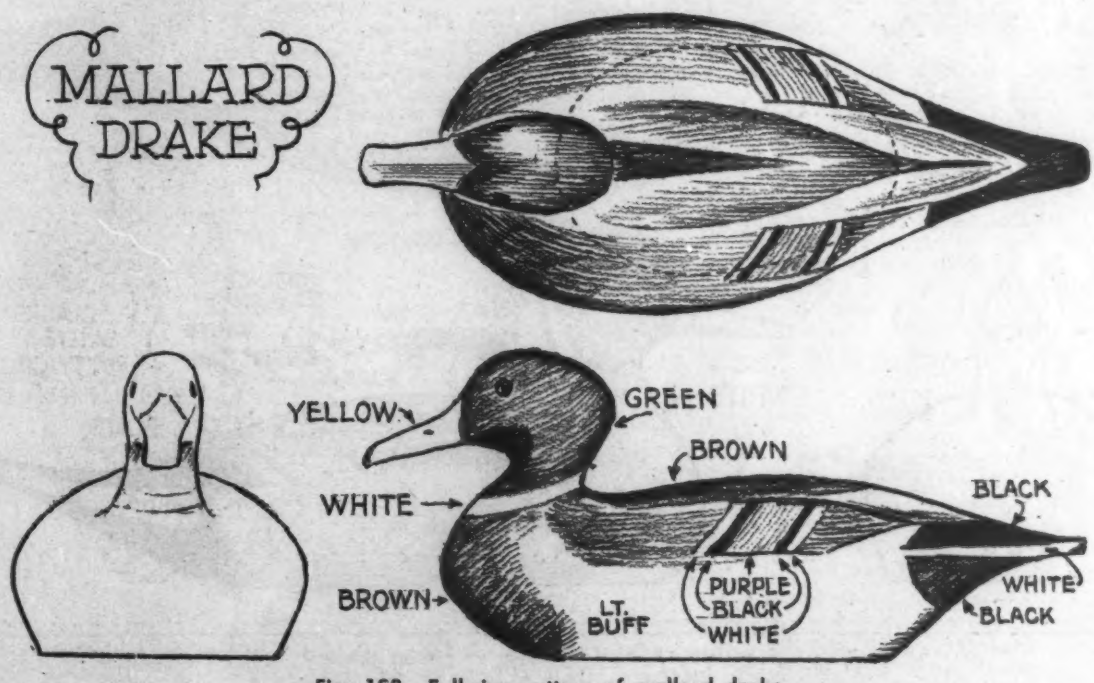


Fig. 193. Full-size pattern of mallard drake

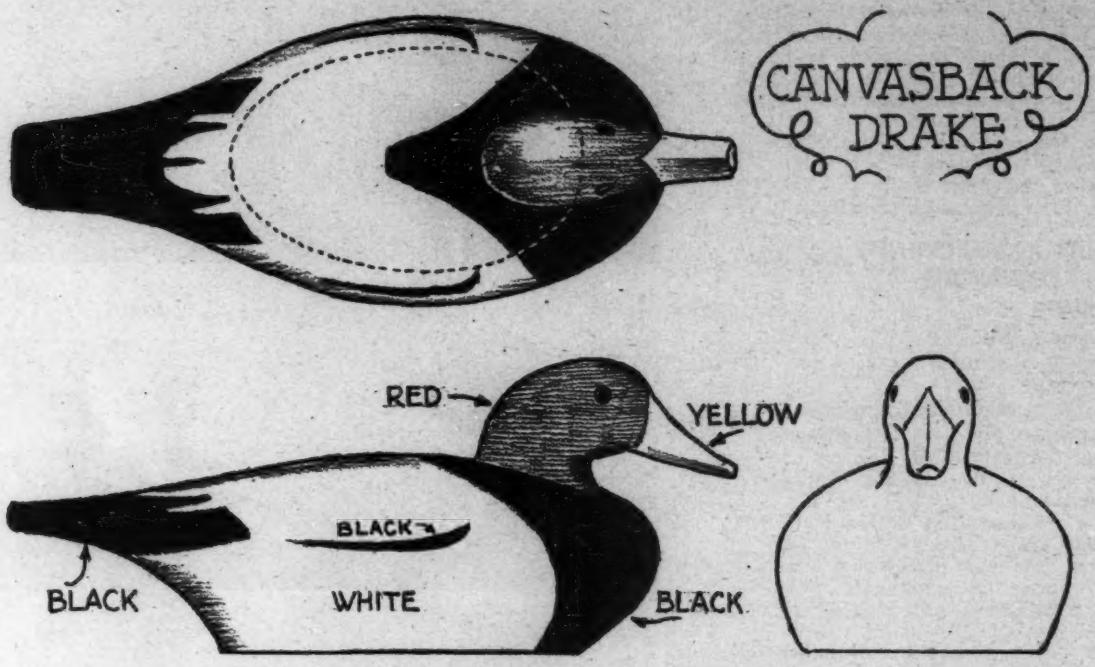


Fig. 194. Full-size pattern of canvasback drake

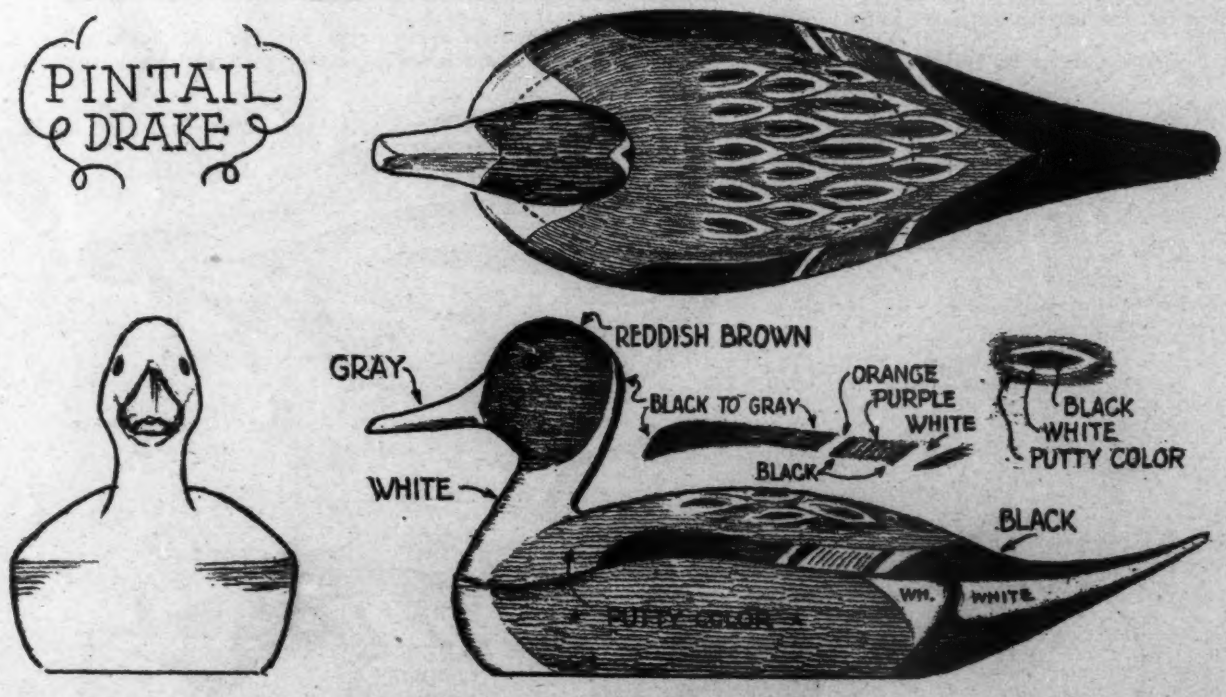


Fig. 195. Full-size pattern of pintail drake

weights, two or three holes should be bored into the base from below. Undercut these holes somewhat with the knife and fill with molten lead. The undercutting prevents the lead from falling out. It is well to cement a piece of felt over the entire bottom, so that the finished surfaces upon which the paper weights may be set will not be marred.

Water colors or artist's oil paints may be used for coloring. If oil paints are used the job is done when the colors have dried, but if water colors have been used, a coat or two of white shellac or clear lacquer should be applied to keep the whittled projects from being soiled by handling.

A LENS SHADE FOR THE CAMERA

W. H. HEGEMAN

Waukon, Iowa

In order to make a perfect lens shade for your camera, you will have to know the long dimension of its picture size, the focal length of the lens, and the outside diameter of the front lens mount.

Let us say, for example, that your camera takes pictures 1⅝ by 2¼ in. We shall call the latter measurement factor 1. It has a focal length of 3 in. This is factor 2. The outside diameter of the front mount is 1⅛ in., which is factor 3.

Lay out the pattern on cardboard, as shown in Figure 1. Use the factors that fit your camera. Notice that the length of the lens shade is one half the focal length of the lens. Note an overlap of ¼ in. for the seam. Cut the pattern carefully.

For material, use the dead-black paper found in envelopes of developing paper. The shade is built up from a number of layers of this paper glued together, forming a light-weight shade that withstands hard use.

Now place the pattern on the black paper and draw the outline with a sharp pencil. Make *eight* of these drawings on the black paper and cut out carefully. Apply liquid glue to the overlap of one of these cutouts and bring together. You will have a cone-shaped shade. This should fit the mount exactly.

Next put a thin coating of glue on the outside of this cone and apply the second black cutout, making it fit perfectly, but with the seam coming at a different position from the first. Smooth glued-up pieces between the thumb and fingers to make sure no air bubbles remain. Repeat until all eight cutouts are glued together. If greater thickness is desired, you can easily add more black cutouts. Place the shade aside to dry and you will find that it will have the same general characteristics of one made of bakelite.

No painting is needed as the surface is ideal for light absorption. It will have just the right amount of flare to prevent cutting off the corners of the picture. Yet it will give the maximum amount of shading. In all shots, this shade will yield sparkling, brilliant prints. It is particularly desirable for use with night pictures or those taken against the sun.

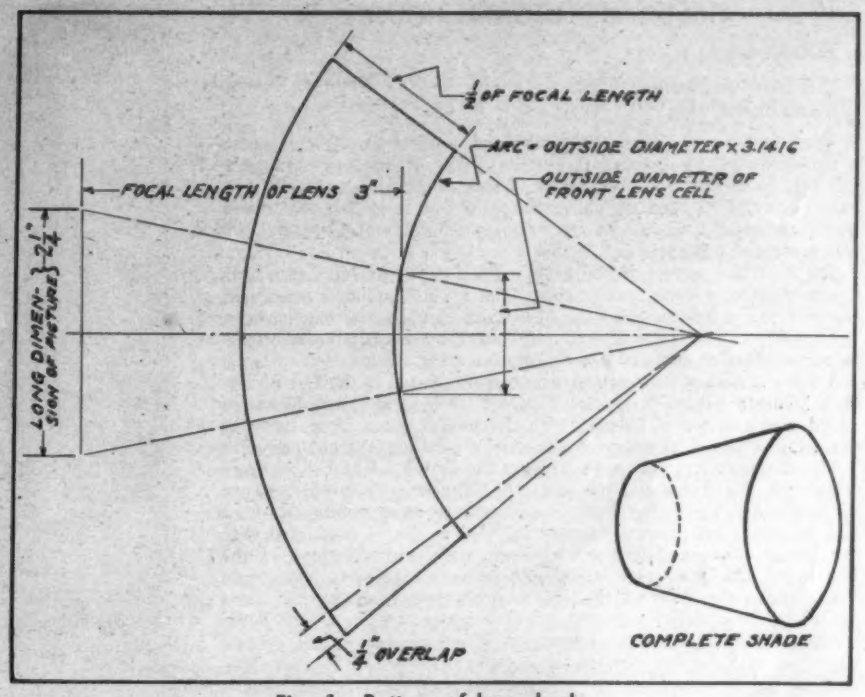

½ OF FOCAL LENGTH
ARC = OUTSIDE DIAMETER X 3.1416
OUTSIDE DIAMETER OF FRONT LENS CELL
FOCAL LENGTH OF LENS 3"
LONG DIMENSION OF PICTURE 2¼"
¼" OVERLAP
COMPLETE SHADE

Fig. 1. Pattern of lens shade

A SIMPLE INVENTORY SYSTEM FOR MATERIALS AND SUPPLIES

I. J. KRAMER

Electrical Construction Teacher
Technical High School
Miami, Fla.

Every vocational training shop is confronted with checking of materials and supplies periodically. Most shop teachers dread the time they have to do so.

I submit this simple, yet effective manner of keeping a running check on materials and supplies.

1. Place materials and supplies in stockroom with each item having its individual and marked place.

2. Place a metal envelope large enough to contain about ten index cards 3 by 5, fastened in front of the item.

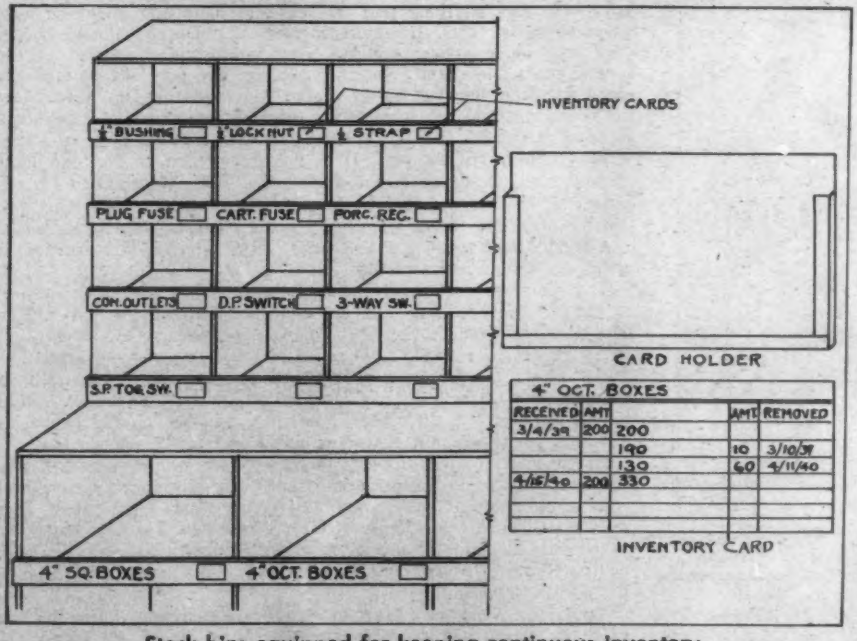
3. Mark each card with the name of the item corresponding to the markings of the shelf or box. Date the card and also register the quantity of the particular item.

4. When taking material from stock simply deduct the amount taken from the amount registered and date the removal. In this manner you have automatically registered your balance on hand of that item.

As the numbers get to a predetermined lower limit, enter the item on your next requisition sheet.

By keeping the cards with the deductions and replacements you can arrive at a definite yearly requirement for your supplies and materials within very close limits.

This system is in effect and I have been using this simple inventory for a number of years and it has proved its value.



RECEIVED	AMT		AMT	REMOVED
3/4/39	200	200		
		190	10	3/10/39
		130	60	4/11/40
4/16/40	200	330		

Stock bins equipped for keeping continuous inventory

Between 5 and 6 million persons have become air minded through flight or ground service in the army, navy, and Marines, or through work in aircraft factories. — *Air Press Service.*

THE DUTCH COLONIAL HOUSE

J. EDGAR RAY

The Stout Institute
Menomonie, Wis.

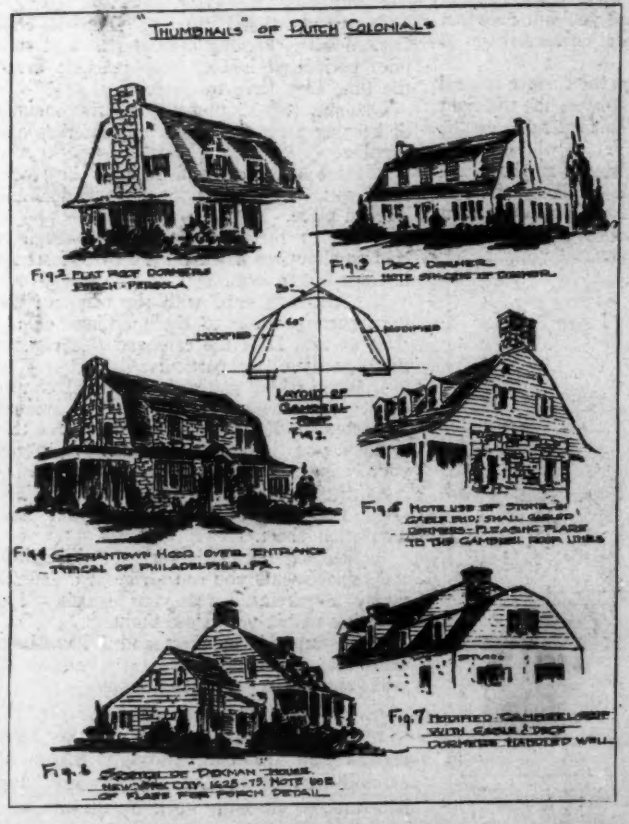
The Dutch traders began migrating and settling on our east coast in the middle of the seventeenth century. Some of their original homes still exist in the states of New York, Rhode Island, Pennsylvania, and New Jersey. The type of house built by the early Dutch showed resourcefulness in the use of the building materials at hand and the design showed originality.

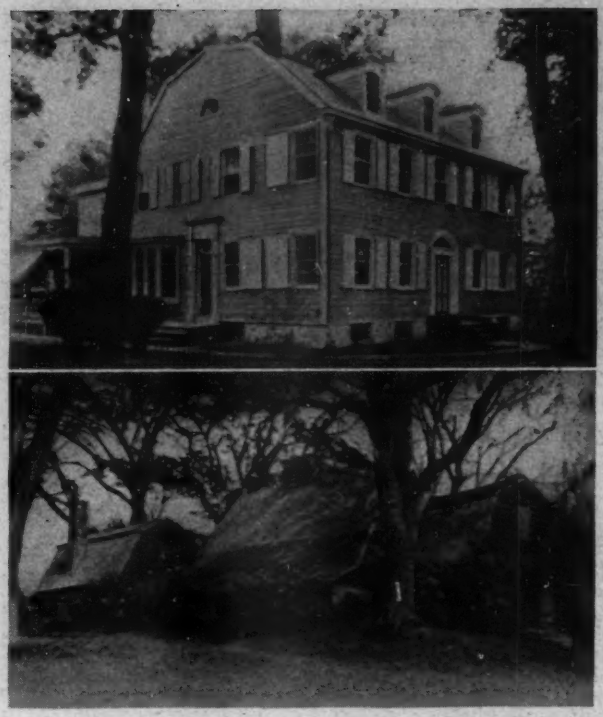
The fact that many of the early homes are still standing proves the sturdiness of their construction. The Dyckman house, shown in Figure 6, is located on Broadway, New York City. It was built between 1625 and 1675 and is referred to and studied by prospective architects as an excellent example of Dutch colonial architecture.

A fine example of frame construction is illustrated in the Dr. Bilderbeck home in Salem, N. J. See Figure 8. A modern porch has been added which is not in keeping with the house, but a close study of the details will reveal many characteristics found in the old originals.

The characteristic feature that makes the Dutch colonial differ from other types is the shape of the roof. The Dutchman designed this type of roof known as the gambrel, to afford more room on the top floor and the result was a pleasing roof line that is always associated with the Dutch colonial. There are so many ugly interpretations of the Dutch colonial house that one should be very careful to learn from study and observation of the old originals just how the roof lines should be to give that charming effect which makes the Dutch house stand out from many of the carpenter designed houses of the present day. The roof can be very practical and at the same time beautiful, if some of the details of the old masterpieces are followed closely. The roof details were quite modest, but at the same time beautifully proportioned in such a manner that the roof seemed to flow from the ridge to the wide extending eaves.

Some of the early houses were often a combination of the gable and gambrel roof worked into a pleasing mass that gave charm to the whole structure. The Dyckman house illustrates this characteristic. See Figure 6. The wide overhanging eaves projected just enough to give the roof an agreeable flare at the eaves line. There was a reason for this wide flaring of the eaves, because frequently the materials were


"THUMBNAILS" OF DUTCH COLONIALS
Fig.2 FLAT ROOF DORMERS PORCH - PERGOLA
Fig.3 DECK DORMER
Fig.4 GERMANTOWN HOOD OVER ENTRANCE TYPICAL OF PHILADELPHIA, PA.
Fig.5 GEORGE DE DYCKMAN HOUSE NEW YORK CITY. 1625-75. NOTE USE OF FLARE FOR PORCH DETAIL
Fig.7 MODIFIED GAMBREL ROOF WITH GABLE & DECK DORMERS HANDLED WELL



Figs. 8 and 9. (Top) Dr. Bilderbeck's house, Salem, N. J. The porch is a late edition. Built in 1813. (Bottom) Henry L. Fairbanks house, Dedham, Mass. — 1616. Oldest house in America

unsuitable to the elements and the extended eaves served as a protection. The soft sandstone often used on the first story would crumble and the mortar would wash out of the joints in the stonework. The wide eaves were usually low and projected from the house just above the head of the first floor windows. The eaves were often projected far enough to cover a porch, which can be seen in the Dyckman house.

The shape of the house was usually rectangular consisting of a floor plan having a large kitchen, parlor, and a few small sleeping rooms on the first floor. An ell projected usually from the rear of the house. The attic, used mostly for storage, was usually packed so as to use every inch of space that was available. The Dutchman packed his attic with as much care as he would pack the hold of his ship.

On the exterior of many of the old originals, one will see many different materials such as stone, wide siding, shingles, stucco, and brick — in fact anything that was close at hand and might be used advantageously. This characteristic made the Dutch colonial houses very unusual in appearance but very interesting in regard to the general mass and detail. Not infrequently, one may see part of the stone fireplace showing on the gable end, and then up a few feet the siding starts in. On some of the originals one may find a beautiful piece of stonework laid up on the front with a rough piece of stonework (rubble) on the rear. It is not uncommon to see two large chimneys on the house at the gable ends. This is accounted for because the heating was largely done by the fireplace. The siding was usually wide and rather rough, while the shingles were wide, rough, and usually hand made (called shakes) all of which gave a hand-made effect throughout the structure.

The windows were usually finished off on the exterior with shutters of the batten type, and later on some adopted the paneled shutter. The windows were of the double-hung type with small panes of 12 to 16 glasses to a window. The size of these panes were 9 by 12 or 10 by 12 in. The windows were placed near the ceiling especially on the first floor to facilitate good ventilation and light in the low ceiling rooms. On the Dr. Bilderbeck house one will see on the gable end a shutter for the complete window all on one side of the window.

In the attics of the originals there were few windows, and if any, they were placed in the gable ends only. These windows were placed close to the floor and were called "lie-on-your-stomach windows." They were placed in this position mostly for ventilation. The Dutchman was very economical in his use of windows because of the tax on glass at that time. A symmetrical placing of a window was typical in the early originals.

When the walls were built of masonry which were quite thick, it gave the windows a deep reveal from the inside of the room. This

Figs. 10 and 11. (Top) Gamage house, High Street, Rockport, Cape Ann, Mass. — 1725. (Bottom) The Stebbins house, Deerfield, Mass.

reveal would be either plastered or finished in wood — plain or paneled. The stool, or sill, would give a seatlike appearance to the deep recessed window. Some of the reveals were built at right angles to the face of the wall or they would have a flare of about thirty degrees which gave the window a more spacious appearance on the inside.

The doors were often of the split type which made the door a unit consisting of an upper and a lower half. This provided ventilation and at the same time kept the children where they could be watched. The entrances were very modest at first and gradually as times grew better more ornament was added to make it more impressive. Side lights, fan lights, transoms, flutings, and columns were added about the time the Adam phase was ushered in the American colonies. The old wooden settle was added to the entrance detail later on and gave the stoop a homey effect. The entrance was usually placed in the center of the front elevations with windows flanking each side in a pleasing balance of the whole unit. The doors were wide and usually low in height, and were paneled in six or eight divisions.

Later on, dormers were added in the old originals, but when they were first built there were no dormers in the roof to mar the simple and restful lines of the roof. The dormers were small and well placed in regard to the windows below and the broad expanse of roof. The dormers either had a flat deck or a gable of a very flat pitch. The dormers in Dr. Bilderbeck's house have a round segmental roof covered with tin. The large deck dormer was added later, and usually placed on the rear of the house when the second floor was used for sleeping accommodations and a bathroom.

The kitchen was the main room of the house. It was in the big kitchen that the family spent most of its waking hours. After the meals were over, the evening hours were spent in the various tasks such as spinning, weaving, and other types of work that were usually done in the home at that time. The kitchen was generally floored around the fireplace and ovens with brick or flagstone, and the pots and pans were hung around the cooking area in a neat and orderly fashion. The wood floors of the house were of wide boards in pine or oak. Some of the floors were raised a step or two from the kitchen.

The parlor was a smaller room containing trinkets and pieces of cabinetwork brought from the mother country, and used only on rare occasions.

The fireplaces were huge pieces of masonry with an opening large enough, in many cases, that a man could walk into them without stooping. The Dutch ovens were part of the fireplace masonry and were built in such a manner as to utilize the heating from the fireplace. The mantels were placed very high over the fireplace and held the usual fixtures such as the clock, candles, and the kerosene lamps. In some of the other rooms, the fireplaces would be flanked on each side with a seat or cabinet of generous size. The fireplaces were built of brick or stone, or both. The hearth would be of brick or stone also. Some of the fireplaces in the other rooms would be faced with bright hand-made colored tile, from three to five inches square. The fireplace on the outside was usually built of stone, topped out with a huge chimney. Many of the fireplaces projected on the inside of the room and were flush on the outside of the house. Frequently part of the masonry would be covered over with shingles or siding.

The stairs were not featured, but just a means of getting to the second floor. Most of them were boxed in with a door at the bottom of the stairs. They were quite steep and usually built of pine. Later the stairs were made more impressive in the larger houses when the second floor was used more for sleeping quarters.

The painting both inside and out was usually in a flat white. If the walls on the outside were in a dark stone, the shutters were painted white for contrast, while if the house proper was mostly in white the shutters were done in a dark green. The hardware was usually finished in black, and was mostly hand made. This hardware on a white door gave the house some very interesting details when summed up in general. Latches were unique and although simple they gave an atmosphere of charm that our modern doors and hardware seldom reach. The furnishings were typical of old Holland, and some beautiful pieces of imported furniture and bric-a-brac were given a place of importance throughout the house. The Dutch were fine cabinet makers, and many highboys, chests, and butterfly tables of beautiful woods were made up probably here in this country. The Dutch had a sense of proportion and good taste which is quite evident in some of the old pieces of furniture in existence today.

The Dutch house will fit into any climate, and today there are many modern adaptations both large and small, patterned after the old originals. It is the type of house that will give the owner plenty of room in a small space, and if the details are carried out faithfully, it will pay for the time taken to study the originals, both in details

Figs. 12 and 13. (Top) A Dutch colonial house designed by the author. Note the entrance detail and the small dormers. The fence details seem to fit in well with the house in general. (Bottom) The same house showing the deck dormer built on the rear. Note the rear entrance detail and the side porch. A gable roof is faithfully carried out

and mass. Many of the modern Dutch colonials seem to have caught some of the spirit of the "old timers" even with the addition of the dormers on the front and rear of the house. Our modern way of living requires more space on the second floor, especially in planning a bathroom. This is usually placed in the rear of the house and occupies part of the deck dormer. It is suggested that the large deck dormer should only come to within three feet of the ends of the house and the face of the dormer should be flush with the face of the first story walls below. This holds true of the small dormers on the front of the house, which, if built, should be small and inconspicuous in regard to the roof area in general.

The projection of the eaves on the gable ends is practically nothing, and never more than three inches at the most. A small unit such as the dormer should be treated in proportion to its size and the scale of the house.

The roof lines must have a definite flare to take away the boxlike effect that would be the result of not following a procedure that would arrive at the general appearance of the originals. The flare to the cornice is very important and this detail alone will give the house either a pleasing appearance or that which we don't want—a cheap imitation of what it should have been. In producing an appropriate flare it will be necessary to add some expense to the cost of the house, and most carpenters will recommend everything but the right thing when it comes to this part of the cornice which will mean so much to the house in general.

The spacing and location of the windows, carefully detailed for size of opening down to the small panes of glass, will have much to do with the desired result when the job is finished. The house in general should be kept close to the ground with the first floor level within one foot above the grade level. It will be necessary to put the cellar windows in areaways, which is the proper way to place any cellar window, if the house is to have the appearance "that it just grew there." Any house, no matter how small or modest, will gain materially in appearance if this advice is followed.

Figs. 14 and 15. (Top) A Dutch colonial in brick construction showing the use of a gable roof with that of the gambrel roof. (Bottom) A Dutch colonial house illustrating the use of two types of dormers — a large deck dormer and a small gable dormer on the same elevation. Charles M. Mart, architect

Figs. 16 and 17. (Top) A modern adaptation. Note the attached garage and the recessed dormers. (Bottom) Modern adaptation with the flat deck dormer with shutters being used. Architects Small House Service Bureau

The use of dormers is almost a necessity, and the type should be carefully chosen in regard to the type of roof, such as the flat, deck, hip, or circular type. The dormers, especially on the front elevation, should be small and delicate. Just remember that a dormer is primarily for light and ventilation only. The use of a large deck dormer on the front and rear elevation is not recommended. The designer should stick to the same type of dormer on the same elevation if possible. In one of the photographs, two types of dormers are shown, but they are placed on different masses, and are handled skillfully under these conditions.

The ceilings on the first floor are usually quite low, about eight feet or eight feet six inches. On the second floor they may be even lower than those dimensions. The sloping ceiling is unavoidable if the designer wishes to keep to a design which will give an appearance of being low and squatty, with that close-to-the-ground effect, which should be one of the aims of the designer. A full ceiling in a small house of this type is almost an impossibility.

Wide siding or shingles are generally used on frame houses, and brick and stone on those with masonry walls for the first story. These walls were often whitewashed or stuccoed in white. The color of the shutters, and the type recommended would depend on the materials of construction that were used. The windows are usually planned along the traditional type and are of the double hung sash, which are divided into small units of glass. It is recommended that the windows on the second floor be a trifle smaller to eliminate any feeling of being top heavy. There are some millwork concerns that have made a study of windows and doors and one can rely on getting windows in the proper scale with a little study of the sizes available.

The entrance details now come already assembled into one unit and there are several types that can be used with perfect confidence that they fit into the general design. Doors for the interior of the house are also available to carry out the same design throughout the house.

Fireplace designs are available with ready built mantels prepared for the builder which are authentic in detail. Fixtures are available also, but if one can find an artisan to make some of the accessories, it would be truly hand made. Hand-made hardware is almost out of the picture, so one has to use the modern types offered.

Figs. 18 and 19. (Top) The old Tarr homestead, Rockport, Cape Ann, Mass. From Pencil Points. (Bottom) Francis Norwood House, Rockport, Mass. 1700–20, from Pencil Points

In the vicinity of Philadelphia there are some excellent examples of the Dutch colonial house built of stone. It is in this type that the Germantown hood is used over the entrance. This is illustrated in Figure 21. The stone work in this area is generally a beautiful piece of work, and the mechanics have had long practice from the time of the dry stone fences of Pennsylvania up to the present time. Then, too, the stone in this area is conducive to its laying in a restful horizontal manner. The natural colors in the stone add much to the general appearance of the house.

The house is placed generally with the long axis parallel with that of the street. In some cases it becomes necessary to place the gable end parallel with the street, which can be handled on a narrow lot.

Figures 21 to 25 illustrate some of the modern adaptations skillfully handled. Brick fits in admirably if it is painted white, although a photograph shows one with red brick walls and a deck dormer of the same material.

Figure 2 shows small flat decked dormers well handled. Figure 3 shows a deck dormer of good proportions. Figure 4 shows the type found in the vicinity of Philadelphia, and built mostly of stone including the deck dormer. The Germantown hood is illustrated in this photo, and fits in nicely with the rugged details of the stonework.

Figure 5 illustrates a beautifully designed gambrel roof. The stonework partly exposed on the gable end is found in some of the old originals. The small dormers are in perfect keeping with the roof.

Figure 6 is a thumbnail sketch of the Dyckman House. Figure 7 shows a definite modification in the gambrel roof, but very pleasing. Note the use of the flat roof and gabled dormers on the same elevation.

The following are the major points of the interior decoration of the Dutch Colonial House:

Room Backgrounds

Decorations

In the first half of the seventeenth century mechanical methods of decoration in moldings and turning are used. The carving and painting render a primitive quality. Later the ornament becomes more classic and refined.

Floors

Early seventeenth century Dutch colonial floors are of brick, tile, or wide oak boards, and in that period were sanded neatly. In the eighteenth century the floor boards become narrower — the narrower ones being laid frequently in parquetry.

Colors

Reds, blues, greens, and yellows are employed in the upholstery and drapery materials. Textures of wood, glass, gilding, silver, brass, copper, and iron with occasional bits of pottery lend color and variety to the interior.

Upholstery and Hangings

Upholstery

The typical upholstery material consists of tapestry, needlepoint, velvet, wool materials, and homespun fabrics. However, in our present-day reproductions, we frequently may use bright chintzes and printed linens.

Wall Hangings

Rugs and carpets should be used sparingly in the better type of Dutch colonial. When used, the most appropriate rug is the hooked rug. In the rooms of the later period one finds a few Oriental rugs.

Furniture

Chests

The earliest type of chest is the Kas, a typical Dutch chest usually of pine with ball feet. The chests change in the later period to highboys, or chests on legs with underbracing generally of oak or walnut.

Chairs

The early type of Dutch colonial chair has very simple turnings, and the seats are leather, wood, or rush. Later types show the influence of the Queen Ann type in the splat backs and cabriole legs.

Wall Pieces

Alcove beds and canopied beds were used at this time. Cupboards of the court, press, and corner type hanging racks, and slant top desks are the pieces most frequently seen.

Dutch architecture is extremely individual. Its designers have left so many precedents that in working in that style you never have the least feeling that you must look it up in a book and find if it was ever done in that way before.

Following is a *Brief on the Dutch Colonial House* which will help

Figs. 20 and 21. (Top) A Philadelphia Dutch colonial, illustrating the so-called Germantown hood over the entrance. (Bottom) A Dutch colonial all in brick including the face of the deck dormer. The author questions the use of casement windows and the wide projection of the eaves on the gable end. George H. Sidebottom, architect

Figs. 22 and 23. (Top) Dutch colonial house designed by the author shows a modest entrance; the dormers somewhat wider than usual. Note the window arrangement. (Bottom) The same house with a different detail of the side porch. The bell shaped roof lines are typical of this house

Figs. 24 and 25. (Top) A modern interpretation of the Dutch colonial house. Note the skillful use of stone, siding, and stucco. (Bottom) A modern version. Note railing detail skillfully handled

to fix the style permanently in the reader's mind if the general features are observed on the illustrations and tied up under the general headings as listed.

Brief of the Dutch Colonial House

Materials of Construction: Stone, brick, and timber, siding, and shingles. Many houses used three or four materials. Masonry walls were usually whitewashed.

Walls and plans: Rectangular main portion. Walls sturdy, and unbroken by bays. Good heavy substantial walls. Stair in the center, boxed or open.

Roofs, Cornices: Broken or gambrel roof well proportioned. Eaves frequently at second floor. Shingled, some covered with tin with standing seams. Cornices just above window heads. Roof, bell-shaped.

Gables, Dormers, Attics: Windows in gable ends. Dormers with roof following line of upper portion of roof. Usually had a flat roof or a gable. Dormers small.

Chimneys, Fireplaces: Chimneys at either end and projecting from the wall. Gable ends were sometimes all masonry with the rest of the building frame. Red brick — white mantel. Tile may be used. Brick or tile hearth. Colored tile in originals.

Windows: Double hung, 12 to 16, small panes, symmetrically placed to a large extent. Blinds with cutouts.

Doorways, Doors, Entrances: Split door — used in entrance. Doors 6 to 8 paneled. Doorways have various types of hoods, usually with classic detail. Porches of various sorts also seen, gabled and sloped roofs.

Details: Wood details bold enough to fit the brick and stone walls. Later details were much finer and more delicate.

Architectural Characteristics: Combination of Dutch traditions and colonial design. Originals around New Amsterdam, Long Island, Staten Island, New York, New Jersey and Pennsylvania. Date 1625–1675. Dyckman House, New York City, 1785, is an excellent example. Suitable and appropriate anywhere.

Interiors, Hardware, Upholstering, Fixtures: Black or brass hardware. Fixtures, plain, dull brass, or bronze. Interiors — quite simple and practical. Colonial furniture — chests, highboys.

SELECTED REFERENCES

Architectural Forum, published by *Time*, Inc., 19 West 44th Street, New York City.

American Builder and Building Age (Chicago, Ill.: Simmons Boardman Publishing Co.).

Aymar Embury, *The Dutch Colonial House* (New York City: Robert M. McBride & Co.).

Aymar Embury, *Building the Dutch Colonial House* (New York City: Robert M. McBride & Co.).

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Pencil Points, East Stroudsburg, Pa.: Rheinhold Publishing Corporation.

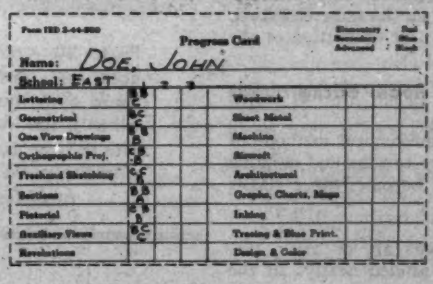
PROGRESS RECORD FOR MECHANICAL DRAWING

GEORGE N. DUERKSEN

High School East
Wichita, Kans.

It is the responsibility and should be the desire of all mechanical drawing teachers to give their students a well-rounded fundamental course. Unless a progress record is kept, this cannot be achieved. Some students come to our high school classes with training in drawing, while others have had none. It seems only fair that intermediate or junior high school work should be given recognition just as one recognizes training received in other high schools.

Certainly it is folly to think that all of us would or can follow a set prescribed course. However, in all of our courses, the drawing



Form ISD 2-44-5000 — Progress Card — Elementary · Red; Secondary · Blue; Advanced · Black

Name: DOE, JOHN

School: EAST

Lettering	A B					Woodwork					
Geometrical	B C					Sheet Metal					
One View Drawings	A B					Machine					
Orthographic Proj.	C B					Sizecraft					
Freehand Sketching	C C					Architectural					
Sections	B B					Graphs, Charts, Maps					
Pictorial	C B					Inking					
Auxiliary Views	B C					Tracing & Blue Print.					
Revolutions						Design & Color					

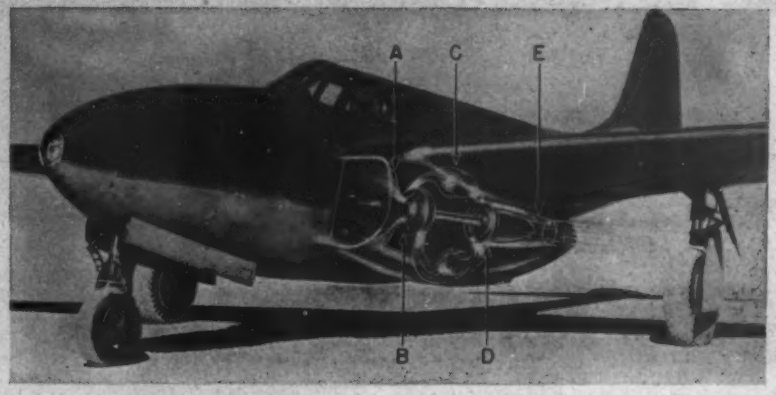
Fig. 1

(Continued on page 20A)

Science Shorts

ON SUBJECTS YOUR STUDENTS WILL ASK YOU ABOUT

JET PROPULSION



AIR IS SWALLOWED by the jet engine's mouth "A," and is picked up by the compressor "B," which squeezes it into the combustion chamber "C." Here the air and fuel burn, increasing the temperature of the air and gases, which, in sweeping through turbine "D," spin it at tremendous speed. The turbine drives the compressor, which is fixed to the same shaft. That's how, after starting by an electric motor, the compressor gets its power. After leaving the turbine, the hot air and gases escape at high speed through nozzle "E," giving the reactive thrust that drives the plane forward.

THE FORCE THAT DRIVES A JET PLANE is the same kind of force that pushes a canoe away when you jump to the dock . . . that makes a deflating toy balloon scurry when it slips from your fingers . . . that spins a rotary lawn sprinkler in a direction opposite to that of the jets of water. Forward thrust of a jet propelled plane is developed as the reaction to the high-velocity discharge through the engine's nozzle. It's the practical application of Newton's third law of motion—that for every action there is an equal and opposite reaction.

THE FIRST AMERICAN JET PLANE was Bell's P59 Airacomet, now in production as a trainer. The fastest plane in the world is the jet-propelled P-80 Shooting Star, a fighter by Lockheed. General Electric jets power these planes and the P80's engines are the most powerful in the air today. These planes achieve peak performance without propeller, radiator, oil-cooling system, supercharger, and complex controls. A ground crew can replace a jet engine in a Shooting Star in fifteen minutes.

The pilot can be relatively comfortable even in the substratosphere because the jet engine can pressurize his cabin. His plane is extremely maneuverable and can climb at great speed. He experiences no new flight problems. In fact, any competent pilot can fly a jet plane.

•

This advertisement is one of a series, designed as a service to teachers of question-asking boys and girls. General Electric Company, Schenectady, New York.

•

Hear the G-E radio programs: "The G-E All-girl Orchestra," Sunday 10 p.m. EWT, NBC—"The World Today" news, Monday through Friday 6:45 p.m. EWT, CBS—"The G-E House Party," Monday through Friday 4:00 p.m. EWT, CBS.

GENERAL ELECTRIC

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A full-rounded curriculum so that every boy and girl will have *full opportunity* to make use of special talents is the new responsibility of secondary education.

The war focused public opinion on the importance of vocational training. The challenge now is to provide adequate equipment and instruction so that mechanically gifted students can develop their skills to the utmost.

Atlas tools are designed to fill this need. Compactly made, and built for precision work, they are ideally suited for the shop classroom. Their low cost makes your equipment budget go farther. For full information and specifications send for our lastest catalog.

ATLAS PRESS COMPANY

1271 N. Pitcher St. Kalamazoo 13D, Michigan

(Continued from page 476)

plates that are required follow the general arrangement of all textbooks.

The chapter headings follow the arrangement list on the 3 by 5-in. card shown in Figure 1.

Procedure: After each six weeks, the student is asked to produce all of his graded plates. In just a few minutes the grade of each drawing is recorded in one of the three squares after the type to which it belongs.

Our beginner's course requires that the student complete three plates of each type. The problems are from elementary textbooks. After three plates have been completed in each type in the elementary course, the student is ready to start on the secondary course which also consists of three problems for each type. The third course is the advanced, and then the student is ready to do work in a major field, one in which he seems to show most talent. As is noted in the upper right hand corner, a separate color scheme is used for the recording of each course.

Anyone can determine the student's progress at a glance as well as note in which type he is doing better or poorer work. Students often ask to see their cards and compare their work with that of another student as well as get a glimpse at their own progress.

I find this method of checking especially useful when students drop out of drawing for a semester or a year. Upon returning then, work can continue just wherever they left off when last enrolled. Aside from that, this record is also valuable in assigning work to incoming students from other high schools. In this case one can ask them to produce work that they have done elsewhere or get that information on a card from their former instructor.

Figure 1 shows the progress card of John Doe. He has finished what is considered a semester's work. The grades are recorded in red. His next semester's work will start on the unit headed *Revolutions*.

In order that the student learns how to use references, an objective test should be given before he attempts the first assignment of each unit.

As soon as a plate is handed in it is stamped with the rubber stamp shown in Figure 2.

Neatness.....			Lettering.....		
Accuracy.....			Linework.....		
Dimensioning.....			Time		
A	B	C	D	F	R

Fig. 2

The weaknesses and mistakes are checked and the grade is circled. The customary grades (A B C D) are used, F determines failure, and the R requests that the plate be re-drawn.

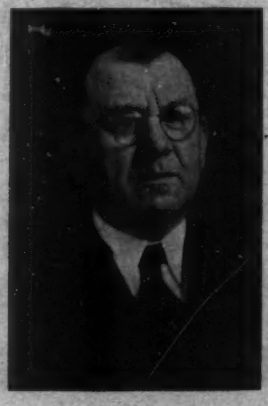
To get a definite grade for each period and for a semester, a point value may be given to each grade. For instance, an *A* grade may merit 5 points, a *B* 3 points, a *C* 1 point, and a *D* 0 points. Six plates comprise a six weeks' assignment. Regardless of how many grades are made, their point value is divided by six and the answer plus judgment on attitude determines the six weeks' grade. Three C's, two B's, and one A would total 14 points. This divided by six would be 2 1/3 points, which would be equivalent to a *B*—.

Personal News

H. F. RUSCH RETIRES

H. F. Rusch, director of industrial arts and vocational education at Oklahoma City, Okla., retired recently after 40 years of service in developing the industrial arts and vocational education program in the state of Oklahoma.

Mr. Rusch came to Oklahoma City in 1905, after having served a term as teacher in the Government Indian Service at Jones Academy, Hartshorn, Okla. He attended Kansas State Teachers College, Emporia, Kans., and acquired further education at The Stout Institute, Menomonie, Wis., Oklahoma City University, Norman, Okla., Oklahoma A. & M. College, Stillwater, Okla., and at Columbia University.



H. F. Rusch

He has taught summer school at the Oklahoma A. & M. College and at the Oklahoma University, Norman, Okla. He has contributed much to the improvement of the profession in the field of vocational and industrial education in Oklahoma. He was the first secretary of the Oklahoma Vocational Association and filled that position until three years ago. Mr. Rusch attended

(Continued on page 22A)

WHERE *Balance* COUNTS

...perfection in bal-
...ars of practice.
..."hang"—is a
...nt resulting
...in making

...b tool
...hick-
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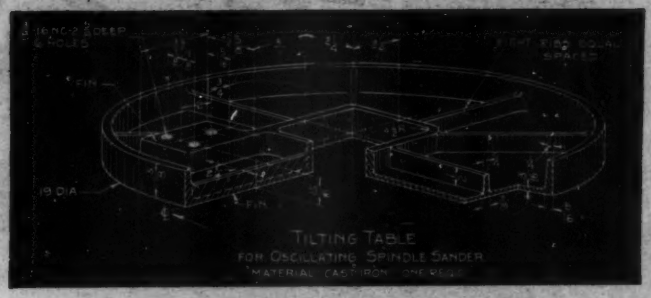
...b

Quality Comes FIRST
PLUMB
Is FIRST in Quality

PLUMB

...TCHETS • AXES • SLEDGES

Ready for December's Challenge?



SOLUTION: We'll be glad to send you a free blueprint showing the solution of this problem. Write to the address below within thirty days. Specify Blueprint No. 138-J12.

This problem continues Dixon's original and exclusive Eldorado Blueprint Series for Instructors.

Ask students to draw the correct orthographic views of this Tilting Table for Oscillating Spindle Sander. First, equip them with Typhonite Eldorado pencils! Eldorado's lines are clean and sharp; its degrees are uniform; its leads are non-crumbling.

We are going to keep this Series going strong through 1946 – so look for the new problem in January.

Here's what one instructor wrote us: "The problems have been a challenge . . . new problem material is like new life in the drafting class."

DIXON'S
TYPHONITE
ELDORADO

SCHOOL BUREAU, PENCIL SALES DEPT., JOSEPH DIXON CRUCIBLE COMPANY, JERSEY CITY 3, N. J.

(Continued from page 20A)

the first meeting of the American Vocational Association at St. Louis, and has only missed two sessions during the years.

Besides being coauthor of the text, *Shop Work*, by Rusch and Conway, Mr. Rusch has been a regular contributor to professional magazines over the years. He has held many responsible positions in state educational associations, and his advice and counsel has been sought by many men in responsible positions in the field.

DINNER HONORING DR. C. A. PROSSER

Dr. C. A. Prosser who resigned as director of the William Hood Dunwoody Institute, Minneapolis, Minn., on September 20, 1945, was honored at a civic recognition dinner arranged for him by the board of trustees of the William Hood Dunwoody Industrial Institute and the Minneapolis Civic and Commerce Association.

Many friends from the fields of education, industry, business, and labor, attended.

Among the speakers at the dinner were Hubert H. Humphrey, mayor of Minneapolis; Dr. J. C. Wright, assistant commissioner of vocational education; and Layton S. Hawkins, chief of the trade and industrial education service, Washington, D. C.; Geo. W. Lawson, secretary of the Minnesota AFL; and Brook Jones, general chairman of the Soo Line Brotherhood of Locomotive Firemen and Enginemen.

Others who spoke were Russell H. Bennett, toastmaster and president of Dunwoody board of trustees; John Crosby, Dunwoody trustee; Donald Davis, president of Minnesota and Ontario Paper Company; Dean M. Schweickhard, state commissioner of education; Ralph T. Craigo, assistant director of Dunwoody; and J. R. Kingman, Jr., Dr. Prosser's successor.

A citation from the secretary of navy was presented by Capt. J. P. Tuttle to Dr. Prosser for directing training of 14,000 warworkers since 1940, and an honorary lifetime membership to the Minneapolis Civic and Commerce Association was presented to him by Emmett Salisburg, president of the association.

DEWEY F. BARICH RETURNS TO HIS JOB

After spending two years in the navy, where he served as an engineering officer for a flotilla of 96 L.C.I.'s, Dewey F. Barich has returned to assume his duties as head of the industrial-arts department at Kent State University, Kent, Ohio.

Barich's flotilla was attached to the 7th Amphibious Fleet, which operated in the Southwest Pacific. He was hospitalized after the second invasion of Mindoro Islands in the Philippines, and spent some time on an army hospital ship, several weeks in a navy hospital in Hollandia, New Guinea, after which he was returned to the states for hospitalization at San Francisco and later at Annapolis.

Dewey F. Barich

Besides taking over the duties of his former position as head of the industrial-arts department at Kent State University, he also has been appointed the University Co-ordinator of Veterans' Affairs.

Those who know Dewey can appreciate what he meant when he said, "Being co-ordinator for the veterans is much to my liking, because I enjoy serving the men who have done such a wonderful job of bringing about the end of the war."

A STRENUOUS CAREER

Carl A. Carlson started teaching at Lane Technical High School, Chicago, Ill., in 1909. After serving there in the capacity of instructor for a number of years he was made shop superintendent of the entire school.

Carl A. Carlson

When the National Defense program was started in 1940 he was made assistant director of that work, and later he was named supervisor in charge of technical subjects for the Chicago school system.

He is a graduate of the Crane Technical High School and received a B.S. degree from DePaul University.

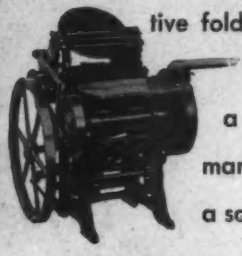
He has been very active in local, state, and national professional circles and at present is president of the Illinois Industrial Education Association.

(Continued on page 25A)

Everything

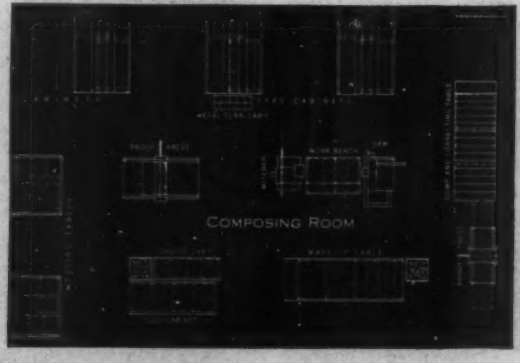
for the School Printing Department *from* ATF

We are able to supply school printing and graphic arts departments with *everything* required to carry on their activities. ATF takes justifiable pride in its ability to fully equip the Composing Room, the Pressroom and Bindery with all the many essential items required in these departments. Our service to school executives does not stop with supplying the physical equipment needed. Our Department of Education also has available instructive folders and booklets which simplify the many problems involved in initiating a new installation, or following through many helpful activities made possible by a school printing department.



Why a School Printing Department

is an Essential Department in an Industrial Arts Program



- It will integrate and vitalize the entire school program.
- It will provide for self-expression through creative experiences in English, art, and social studies.
- It will provide a powerful school publicity medium.
- It will motivate and coordinate all academic work.
- It will socialize the life and interests of students.
- It will emphasize "Learn by Doing."

For information about equipment, ideal floor plans and instructive literature, write to

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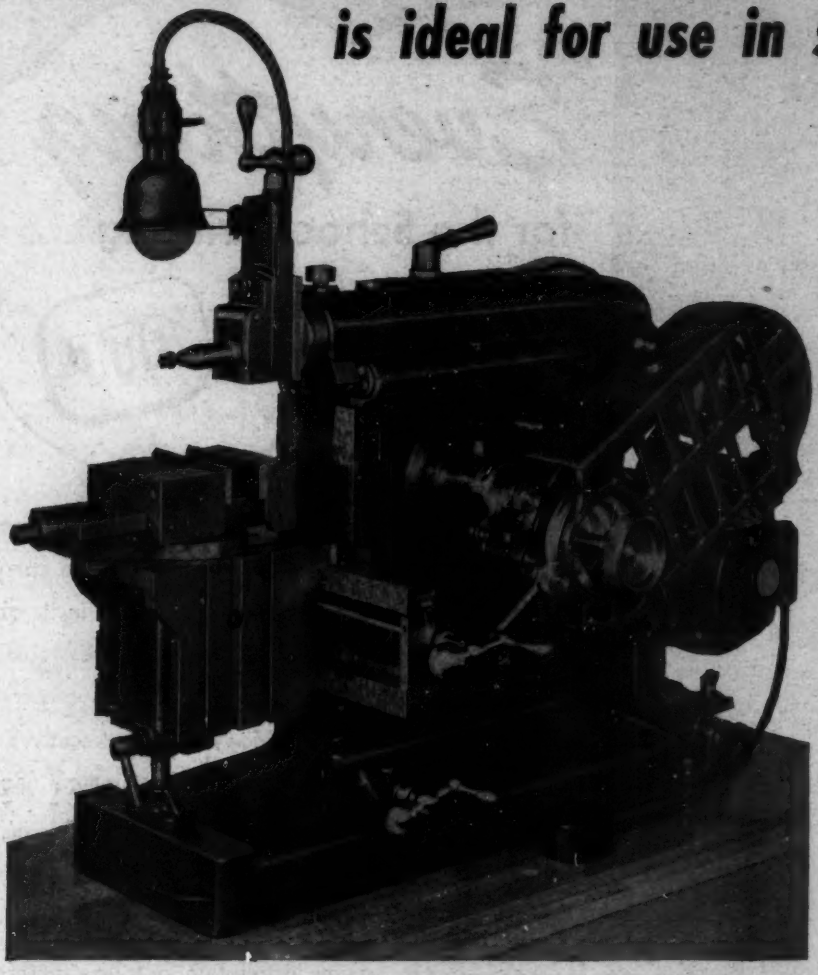
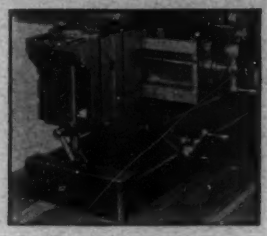
Department of Education

200 ELMORA AVENUE, ELIZABETH B, NEW JERSEY

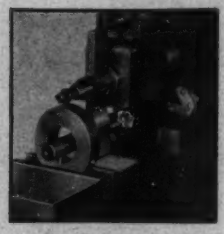
AMMCO 7" PRECISION SHAPER

is ideal for use in school shop!





★ Has "VEE" Type Ways, comparable to those of large, expensive shapers.



★ Handles a wide variety of work.

★ Portable Model is mounted on maple cabinet.

Students quickly acquire ability to produce accurate work on this precision machine

Leaders in school shop instruction unreservedly recommend the AMMCO 7" PRECISION SHAPER. It is small in size, but it is mighty in efficiency and precision... It incorporates all important features of larger machines selling for hundreds of dollars more than the Ammco . . . and users of the Ammco tell us "it's the finest made". . . Simplicity of operation, plus special safety features, make this machine ideal for student use. A wide variety of work can be done on this shaper, and as one instructor has said —"it is a precision machine of a thousand uses."

Made for bench installation, or as a portable unit.

ARMY E NAVY

Write today for specifications and prices

AMMCO 2100 COMMONWEALTH AVENUE
NORTH CHICAGO, ILLINOIS

(Continued from page 22A)

WALTER J. ROBINSON APPOINTED HEAD

Walter J. Robinson, associate professor of industrial arts, was recently appointed head of the industrial-arts education department, Northwestern State College, Natchitoches, La.

Mr. Robinson received his B.S. degree from the Central Missouri State Teachers College, Warrensburg, Mo., and the M.A. degree from the University of Missouri, Columbia, Mo. He has also done some graduate work at the University of Missouri.

His teaching experience consists of 13 years of industrial arts in various Missouri schools, 4 years in St. Louis, and 18 months as supervisor of War Production Training at the Hadley Technical High School, St. Louis, Mo.

He has also spent two summers on the industrial-arts faculty at the University of Missouri, and 18 months as instructor-trainer at The Armored Force School, Fort Knox, Ky.

LAURENCE J. YOUNG DIES

Laurence J. Young, former supervisor of industrial arts in the New York City Elementary and Junior High Schools, died at his home on September 4, 1945, at the age of 59.

Mr. Young was born on March 30, 1886, in Old Orchard, Me. He was educated in the grammar school and high school in Sanford, Me., and in Pratt Institute, New York City.

In 1907 he began his teaching career in the New York Elementary Schools, and after ten years in the shops, his ability as a leader and educator won for him the position of supervisor of shopwork which position he held until his resignation on April 1, 1943. Then followed a short two years as supervisor of training courses with the Sperry Gyroscope Company. This period was terminated in the spring of 1945, due to ill health.

In 1914 Mr. Young served as a member of a Committee of Teachers, sent abroad by the U. S. Department of Education, to study and observe industrial-arts institutions in Germany. This mission lasted six months when it was suddenly terminated by the beginning of the first World War.

During his 26 years as supervisor of industrial arts, he was also engaged to teach a wide variety of industrial arts and vocational subjects in Hunter College, the College of the City of New York, and the New York State Teacher Training school.

Mr. Young is survived by his wife, a son, and a daughter.

♦ Dr. Franklin R. Zeran, specialist in occupational information and guidance services, has been appointed director of admissions at the University of New Mexico.

♦ C. M. Miller, director, Kansas State Board for Vocational Education, is serving his second year as president of the Vocational Education Department of the National Education Association.

♦ V. E. Timmons has been appointed co-ordinator-instructor; and Clyde Swender, instructor of related subjects in the co-operative training program just inaugurated at the Argentine High School, Kansas City, Kans.

♦ W. B. Skelton, instructor at Ft. Leavenworth, has received his discharge after serving two years in the army. He has resumed his duties as co-ordinator of the co-operative part-time retailing program at Independence, Kans.

♦ Dr. John H. Thorp has been elected superintendent of schools in the Second Regional High District of Connecticut, recently formed by the towns of Bethany, Cheshire, and Prospect.

Dr. Thorp was formerly in the Connecticut State Department of Education where he was a general consultant for secondary education. Part of his work was serving in an advisory capacity to a number of towns considering the formation of regional high school districts. He was also consultant for industrial arts and the state department has recently published "A Hand Book in Industrial Arts" which was produced under his direction.

♦ Dr. Homer J. Smith, University of Minnesota, Minneapolis, Minn., recently participated in the Annual Teachers Convention held at Regina in Saskatchewan. He addressed general assemblies on both Industrial Education and Vocational Guidance topics.

Early in November Dr. Smith appeared at Wahpeton, N. Dak., under public school auspices and also spoke to students and faculty of the State School of Science in that city.

♦ H. T. Widdowson, for the past several years on leave with the U. S. Office of Education, has returned to the University of Minnesota, Minneapolis, Minn.

♦ Harry A. Pederson, a doctoral candidate, has returned to the University of Minnesota, Minneapolis, Minn., and is doing part-time teaching, after having been engaged in teacher-training service at Fort Knox.

♦ Armand G. LaBerge and Clifford K. Lush have again taken up their work with the Minneapolis Public School system, as also Ralph T. Craigo of The Dunwoody Institute.

♦ Jasper R. Simpson has joined the faculty of Argentine High School, Kansas City, Kans., as instructor of electrical trades. For the past four years he has been foreman of electrical inspection at North American Aviation, Kansas City.

♦ Leroy Brewington, supervisor of the printing department, Kansas State Teachers College, Pittsburg, Kans., is vice-chairman of the College Publications committee.

♦ John White, printing instructor, Pittsburg, Kans., is president of the Pittsburg Teachers Association this year.

♦ V. A. Anderson has been appointed instructor of aircraft engine mechanics at Argentine High School, Kansas City, Kans. Mr. Anderson comes from the Pan-American Airways, Miami, where he had worked a year and a half on line maintenance and trouble shooting. Previously he was with Douglas Aircraft, and attended a trade school conducted by Douglas. He holds aircraft, engine, and student pilot's licenses.

♦ Homer S. Coy, day trade electrical instructor, Topeka, Kans., attended Colorado State College, Ft. Collins, Colo., last summer.

(Continued on next page)

Because **DESIGN** *is fundamental in Practical Arts, Fellowcrafters'* ISLAND DESIGN CONTEST

is planned to promote the creation of industrial designs, to encourage originality and interest in design through presentation of a specific objective toward which students can work, and to cooperate with the instructor in project planning.

ANY STUDENT in any art or industrial arts class in any public, private or parochial secondary school (7th to 12th grades) is eligible to enter this contest.

DESIGN MOTIFS must have their source in the island arts of the Pacific area, and are to be re-designed, re-arranged or modified in a manner demonstrating originality, for execution in a specific crafts medium (leather, wood, metal, etc.).

FULL DETAILS of the contest, including cash awards, appear in the newspaper THE FELLOWCRAFTER, copies of which and entry blanks may be obtained from your nearest Fellowcrafters' distributor or from Fellowcrafters, Inc.

ENCOURAGE YOUR STUDENTS TO ENTER CONTEST

• • • • •

PLASTICS — SHEET, CYLINDER, SCRAP

FIRST GRADE LUCITE
Fully masked, free from imperfections.

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1214	20" x 25"	3/32"	$6.94
1204	20" x 25"	3/16"	8.68
1244	20" x 25"	1/4"	10.41

LUCITE SCRAP:
Not warped or scratched, most pieces masked and larger than ordinary "scrap."
Per lb. pkg. $1.40

AMBEROL: (Cast Resin Plastic) See P. 25 Fellowcrafters' Catalog for full description. Red, black, blue, green, yellow, not polished, 1/8" thick.
1019-24. 12" x 24", sheet $3.00, doz. $33.00.
1019-3. 3" x 8", sheet $.30, doz. $3.30.
Ivory only, cast in glass, 1/8" thick.
1020-24. 12" x 24", sheet $3.24, doz. $35.75.
1020-3. 3" x 8" sheet $.35, doz. $3.85.
Thick wall cylinder.
1022. O. D. 3 3/16", I. D. 2⅝", 8⅝" long. Ea. $1.40, doz. $15.40.

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Blue and yellow only, sizes ¼" x 8" to 2" x 8". Special price per lb. $.40.

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Nashville 3, Tenn., Nashville Products Co., 158 2nd Ave., N.
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(Continued from previous page)

♦ VICTOR L. BOWERS has returned to his position as chairman, industrial-arts education, after nearly three years of service as training administrator, San Antonio Air Technical Service Command, Kelly Field, Tex.

Since May, 1944, Mr. Bowers' duties included the organization and supervision of individual technical training for enlisted men assigned to Air Technical Service Command.

At a dinner given in his honor, August 25, he was awarded the Air Technical Service Command Award of Merit for exceptional and superior service to the war effort.

♦ JIM GILBREATH, director of the evening program in Chanute, Kans., has been given the supervision of the entire industrial education program in the city school system. Previously he supervised only the work at the Senior Trade School.

♦ ORUS WILSON of the Missouri State Department of Education, has taken over as a district supervisor in place of W. H. GUENTHER, who becomes superintendent at Newburg, Mo.

♦ MARVIN PARKER, formerly equipment supervisor in the Vocational Agriculture Division, State Department of Education, Jefferson, Mo., has resigned to accept a position in the College of Agriculture, University of Missouri.

♦ LESTER MADDOX, district supervisor, vocational agriculture, has resigned to go back to his old job as vocational agriculture instructor at Mountain Grove, Mo.

♦ ARMIN SOPH, vice-principal of Atchison, has been appointed to serve as director of the evening program at Atchison, Kans. Mr. Soph replaces HAROLD MCCLEAVE who will assume other duties in the school.

♦ PERDUE B. GRAVES, director of adult education, Topeka, Kans., served as president of the Council of Social Agencies the past year.

♦ SUPERINTENDENT CHARLES E. HAWKES has returned to take up his duties in Salina, Kans. He was a major in the U. S. Army previous to September 10. During his three years in the service his duties were largely in a command capacity in the Army Airway Communication System. His last assignment was that of Commanding Officer of General Headquarters Compliment, and C.O. of a small post.

♦ CARL TINKELPAUGH, co-ordinator at Moberly, Mo., during the past year, has resigned to accept a position as industrial-arts teacher at Monett, Mo.

♦ MAX CHERRY, former co-ordinator at Aurora, Mo., has been employed in the same capacity at Carthage, Mo. Mr. Cherry replaces Mr. Haggard who resigned to accept the principalship of the Carrollton High School.

♦ J. F. CURNUTT, a member of the high school faculty at Mount Vernon, Mo., has resigned to accept the co-ordinatorship at Aurora, Mo.

♦ DELBERT DUNKIN, formerly assistant co-ordinator in Columbia, Mo., and more recently employed with Pratt and Whitney, Kansas City, has been appointed co-ordinator at Mexico, Mo.

♦ G. G. PETERSEN has been appointed head of the electrical engineering department at the Pueblo Junior College, Pueblo, Colo. Mr. Petersen has a B.Ed. degree from the Southern Illinois Normal University and has done graduate work in industrial-arts education and electrical engineering at the Ohio State University and University of Illinois.

♦ PROF. LAURANCE F. SHAFFER, recently relieved from active duty as lieutenant colonel and chief of the psychological division, headquarters, AAF Personnel Distribution Command, has been appointed head of the guidance department, Teachers College, Columbia University, New York 27, N. Y.

♦ DR. DONALD E. SUPER, former captain and chief of the psychological branch, AAF Regional and Convalescent Hospital, Miami Beach, Fla., has been appointed associate professor of education, specializing in vocational guidance and occupational adjustment, at Teachers College, Columbia University, New York 27, N. Y. Dr. Super was previously associate professor of educational psychology and director of the personnel bureau at Clark University.

Association News

♦ The Illinois Vocational Association 1945 Convention Book is worthy of careful perusal, and the officers of this enterprising organization deserve a vote of deepest gratitude for showing the educational world how to do a real job even though severely handicapped.

As Florence Bodenbach, Home Economics Department, University of Illinois, Urbana, Ill., and president of the I.V.A., states: ". . . Not to lose wholly this opportunity of contacting you in the field, the logical alternative seemed to be to publish the papers that would ordinarily have been given as convention speeches."

The 1945 Convention Book does just this, and does it very well indeed!

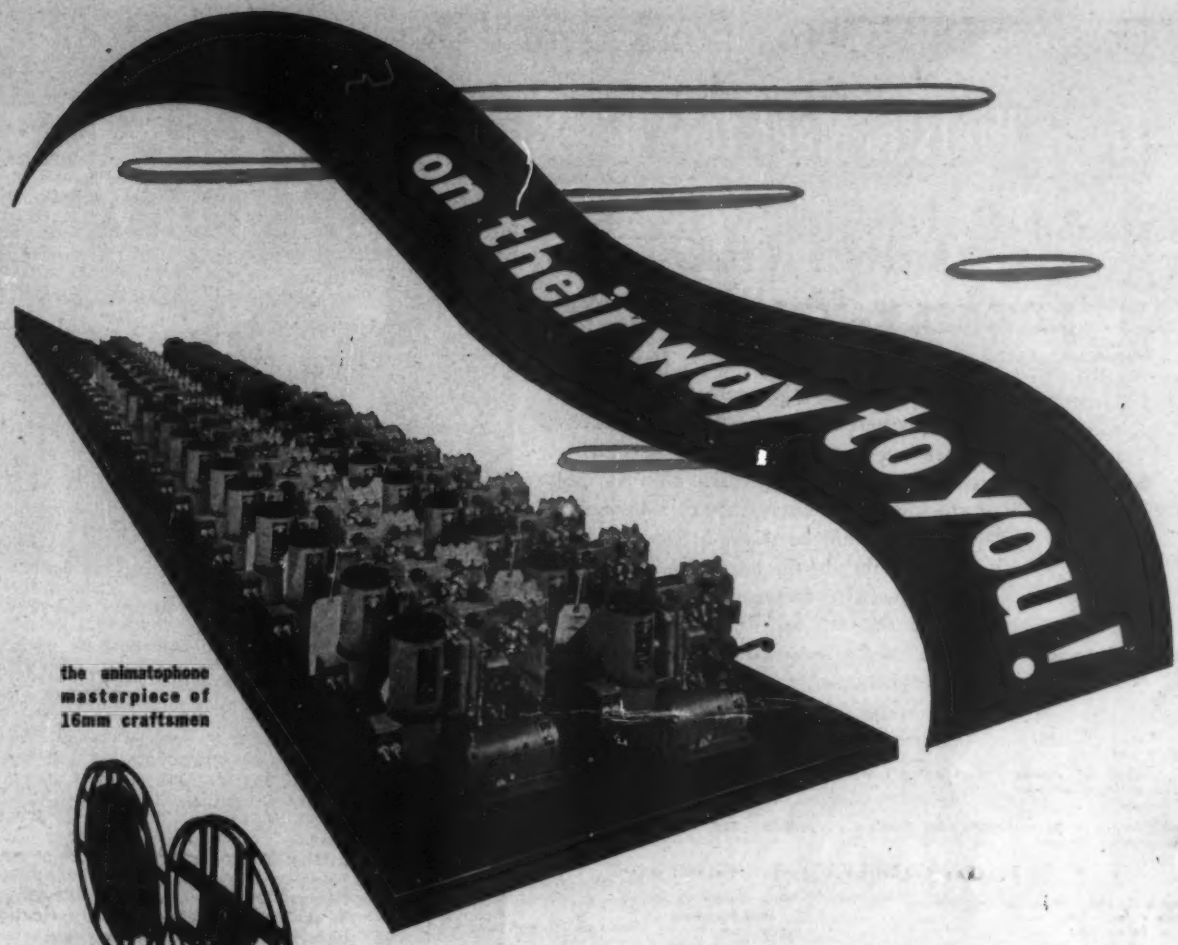
♦ The Mechanical Drawing Association of New England held its fall meeting on Saturday, October 20, 1945, at 9 a.m., at Northeastern University, Huntington Ave., Boston, Mass.

Carl G. Bjork, design manager, Stone and Webster Engineering Corp., Boston, Mass., spoke on "Engineering Drawing as an Occupation."

Fred Bryant, Mason-Neilan Regulator Co., Boston, Mass., discussed "Industrial Production Illustration Drawing."

♦ The Stout Institute Alumni Association has elected the following officers for 1945–1946: national president, D. K. Mereen, 3922 N. 23rd St., Milwaukee, Wis.; national first vice-president, John Ruedebusch, Menomonie, Wis.; national second vice-president, Harvard Smith, 7618 Fifth Ave., Kenosha, Wis.; Southeast regional vice-president, Joe Tendryk, 1812 E. Beach, Gulfport, Miss.; Midwest regional vice-president, Miss Margaret Gibson, Menomonie, Wis.; West-Coast regional vice-president, Peter Krogstad, 6722 Arbutus Ave., Huntington Park, Calif.; national secretary, W. R. Baker, The Stout Institute, Menomonie, Wis.

Twenty-five thousand fingers were permanently injured during 1944. — *Safety News.*



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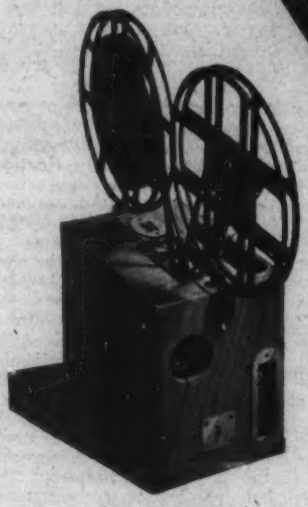

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News Notes

♦ A four-year course in technical woodworking has been started in the High School, Jamestown, N. Y., which is to prepare the future workers who are to carry on the traditions of the old masters in the field of furniture designing and production.

♦ The Victory Loan, as did the war loan drives, will depend on the schools to a considerable extent for its success.

While the war is over, and military equipment need no longer be produced in huge quantities, nevertheless war costs will still be with us and must be paid. There will be such things as mustering out pay, care of veterans, payment of contract cancellation commitments, payment of bills for war materials already received, maintenance of a large armed force, and similar expenses.

We must all "help finish the job."

♦ Hobart Trade School, Inc., Troy Ohio, conducted by The Hobart Brothers Company, are now enrolling veterans of World War II in a specialized welding and metalworking training course which has been approved by the Veterans Administration to train discharged soldiers under the G.I. Bill of Rights.

The new training course covers a period of 16 weeks, totaling 640 hours of individual instruction in the following subjects: arc and acetylene welding, special alloy metals welding, carbon arc welding, hardfacing and tool welding, metalizing with the metal spray gun, resistance welding, "submerged melt" process of welding with automatic head, stud gun welding, and the heliarc method of welding magnesium and other lightweight metals.

Students may enroll for the entire course of 16 weeks or select shorter specific training units.

Applications for training under the G.I. Bill of Rights may be secured through any Veterans Administration Field Office or from the Hobart Trade School, Inc., Troy, Ohio.

♦ To help prepare American youth to live happily and efficiently in the new Age of Flight, United Air Lines has prepared helpful free educational material which may be had for the asking.

Write to United Air Lines, School and College Service, 5959 South Cicero Ave., Chicago 38, Ill.

♦ Vocational schools in the fifty Wisconsin communities in which they are located offer the returning veterans courses needed for on-the-job or apprenticeship training or high school graduation, in classes with other persons of equal maturity. Veterans are admitted to the State Teachers Colleges, The Stout Institute, and the University of Wisconsin upon evidence of ability to carry the courses they elect even though they have not graduated from high school. If their work is satisfactory they will be graduated with the degree appropriate to the course taken.

♦ A new index to motion pictures and slide films loaned free to schools except for transportation costs is announced by the School Service Department of the Westinghouse Electric Corporation.

The index covers a wide range of subjects, from science to economics. The films described in the booklet may be used in grades 7 through 12. The booklet contains an index with recommendations as to the type of class for which each film is best suited and suggestions for related supplementary materials to enhance each film's usefulness in the classroom.

Teachers may secure a copy of the new index, "Motion Pictures and Slide Films for School Use" through the School Service Department, Westinghouse Electric Corporation, 306 Fourth Avenue, Box 1017, Pittsburgh 30, Pa.

♦ For distribution to high school teachers, the School Service Department of the Westinghouse Electric Corporation announces a booklet describing free and inexpensive teaching aids.

Designed primarily for grades 7 through 12, the new and revised educational materials listed in the catalog include booklets, charts, motion pictures and slide films for classes in science, vocational training, and home economics. Many of the booklets described may be obtained in quantities for distribution to students.

Teachers may secure a copy of the new teaching aids booklet through the School Service Department, Westinghouse Electric Corporation, 306 Fourth Avenue, Box 1017, Pittsburgh 30, Pa.

♦ At a recent meeting which was attended by twenty members of the apprenticeship committees in Topeka, Kans., a special committee was appointed to work out plans for starting related training classes for apprentices. This special committee has met and made plans to start classes on October 1, for building trades apprentices.

♦ A series of one-day workshops for trade teachers and co-ordinators are being planned for various sections of the state of Missouri.

♦ Dr. Herold C. Hunt, superintendent of the City Schools, Kansas City, Mo., has announced that in the Manual High and Vocational School armed service veterans or civilians may get any course they want and when they want it and receive diplomas as speedily as they can complete the required units. Dr. Hunt hopes that this will eventually become a new type of school, a community institute for adults.

The courses were begun with the school opening this year. While the courses are offered primarily for veterans they are open to civilians as well. Regular high school standards and requirements will be maintained.

♦ A list of reference and supplementary reading materials and motion pictures has been made available to teachers, school librarians, and leaders of study groups by the National Association of Manufacturers. In presenting this twelfth *Bibliography of Economic and Social Study Material,* the Association has endeavored to list those of its free publications and motion pictures which will prove most valuable in enriching the background knowledge and stimulating the thinking of students of these topics.

For further information regarding the Bibliography write to the National Association of Manufacturers, 14 West 49th St., New York 20, N. Y.

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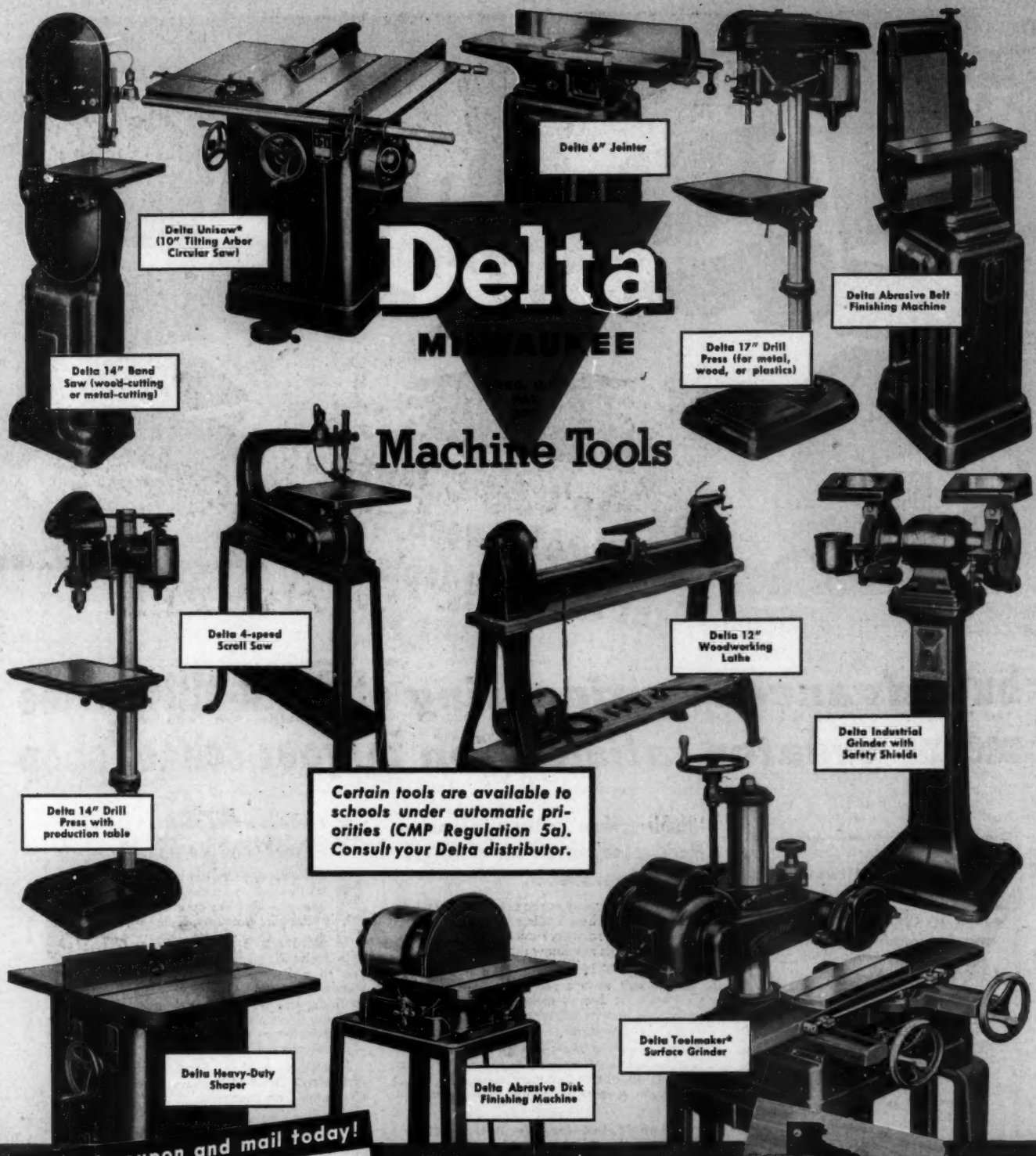
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LOW TEMPERATURE WELDING

(Continued from page 24A of the November, 1945, issue)

The technique is quite similar to brazing. The parts must be cleaned, coated with flux, and then heated. The alloy is applied without fusion of the parent metal. But here the similarity ends. The temperatures are averagely lower than those of brazing and the affinity of the alloys for the parent metal is greater, resulting in a joint that is metallurgically a real weld.

What has happened is that a liquid alloy has formed itself on the parent metal at a temperature preindicated by the melting of the flux, especially designed for each welding rod. This surface alloy is the eutectic alloy of those metals present at the point of union with the parent metal. The flux has acted very much in the manner of a catalyst, reducing surface tension, preventing oxidation, and aiding in alloying.

Eutectic is a metallurgical term which refers to the lowest melting alloy of the series of alloys which may be made from any given group of metals. The low temperature welding rods are not all eutectic alloys, but the reaction occurring between the weld material and the base metal during the operation produces a eutectic alloy on the surface of the base metal. Because of this alloying effect this process is definitely welding, although the alloys may be applied far below the fusion temperature of the base metals.

The eutectic process is well illustrated by a simple experiment. A sheet of copper is coated with the appropriate flux for an aluminum alloy rod will make a sharp hole right through the copper. This hole is the result of the eutectic alloy of copper and aluminum being formed which has a melting point some 700 deg. F. below the melting point of copper. This alloy being completely molten at this temperature has allowed the aluminum rod to be passed through the copper at that point.

The advantages of low temperature welding are obvious. The lower temperatures applied to the parts being joined mean less distortion and in many cases practically no metallurgical change in the base metal and in the filler metal. Welding rods based on the theory of this process have been developed for practically every alloy, including cast iron, malleable iron, all types of steel, copper base metals, including aluminum bronzes, nickel alloys, magnesium, tungsten carbide, and even zinc die castings. Not only are these rods adapted to joining these various metals, but for each group several different varieties have been created with various melting points thus making it possible to solve extraordinary problems. For instance, to repair delicate cast iron cases with cracks, an alloy is available that requires only 354 to 600 deg. F. where no danger of further cracking is present. Another example is in the joining of aluminum heat-treated parts. For this purpose there is an alloy which will join parts below drawing temperature. In the case of steel parts that have to be annealed after joining, there is a rod which bonds at 1300 deg. F. and remelts between 1700 to 1800 deg. which will stand annealing without damage to the joint.

Thus rods are available for joining, filling up missing metal, or filleting. They can be used for overlaying — some special rods were developed especially for protection against frictional wear. These are available in two types — the nonferrous, whose ferrous base gives a hardness up to 300 Brinell and which are applied between 1000 to 1200 deg. F., and the ferrous base type which is the hardest up to 620 Brinell and require local heat to approximately 1800 deg. F.

The filler rods generally contain the same metal or metals as the base metals they are designed to weld.

The new process has been applied in various fields. First — in the production joining of light and medium gauge materials and dissimilar metals or gauges. The main advantages are greater speed of application, less distortion and, because of the low temperature, metallurgical changes in the parent metal are often completely avoided. A further important advantage is the fact that the joints are extremely clean and require a minimum amount of finishing.

The second field is in salvaging defective castings and parts. The low temperatures used will prevent distortion even of completely machined parts. Further, an added advantage is that the joints cannot be detected, being color matched with the parent metal.

The third field is that of repair welding. Many of the filler rods being adaptable to numerous metals or alloys, the job can be done without exactly determining the composition of the part. Further, the temperatures being lower, preheating can be reduced — thus, it speeds and simplifies repair work. Metallurgical changes in the metal are usually avoided and, in the case of cast iron, there is no hardening as the parent metal is not fused, making machining very easy.

An occupational death took place every 30 minutes during 1944. — *Safety News.*

Approximately 900 persons are fatally shot each year in hunting mishaps. This is one third of those accidentally killed by firearms. — *Safety News.*

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AIRCRAFT SHEET-METAL WORK

ISADORE M. FENN

Chicago Vocational School
Chicago, Ill.

(Continued from page 36A of the November, 1945, issue)

Q. 80. *Why should the copper not be allowed to become overheated?*

Ans. Excessive temperatures burn the tin off the soldering copper. This makes it necessary for the copper to be tinned again.

Q. 81. *What fluxes are recommended for use with grade A soft solder?*

Ans. (1) Rosin, zinc chloride (cut acid), or rosin-glycerine-steric acid compound. (Used with most metals that can be soldered). (2) Hydrochloric acid (raw acid). For use with galvanized iron and zinc.

Q. 82. *What fluxes are recommended for use with high-melting-point solder?*

Ans. (1) Zinc Chloride. (2) Zinc Chloride and powdered sal ammoniac.

Q. 83. *What fluxes are recommended for use with hard solder?*

Ans. (1) Powdered borax; (2) Powdered borax and carbonate of soda.

Q. 84. *Why must work be thoroughly cleaned after soldering?*

Ans. To remove all traces of flux.

Q. 85. *In what shape does sheet metal come?*

Ans. Sheet metal comes in flat stock and must be formed to the desired shape.

Q. 86. *Name some types of sheet metal seams and joints.*

Ans. (1) Butt joint; (2) Flange butt joint; (3) Plain lap seam; (4) Countersunk lap seam; (5) Inside lap seam; (6) Outside lap seam.

Q. 87. *What are the methods most commonly used for holding sheet metal together?*

Ans. (1) Butt joints; (2) Lap seams; (3) Single lock seams (grooved); (4) Double seams; (5) Pittsburgh locks. Other seams that may be used are the double lock seams, concealed locks, and dovetail joints.

Q. 88. *How is a butt joint made?*

Ans. By bringing the two edges of the metal together with no overlapping and is usually used on heavy sheet or plate to be connected by welding.

Q. 89. *When is a flange butt seam used?*

Ans. When thin gauge sheets are to be joined by welding.

Q. 90. *How is a lap seam made?*

Ans. By allowing a portion of the metal (in excess of the net size) to overlap. In making up small articles with this seam, solder is usually used, while for larger seams, where the metal is subjected to strains, rivets should be used and the riveting is often followed by soldering. If for any reason rivets are objectionable on heavy sheets, the seam may be welded.

Q. 91. *How is a single lock seam made?*

Ans. It is formed on the cornice break or bar folder and is made by turning the edges in opposite directions for the opposing sides to be joined. The sides may then be hooked together and grooved to prevent them from unhooking. This lock is generally used as the vertical seam on light metal objects such as buckets, pipes, cans, funnels, tanks, etc., and does not have to be soldered unless the work is to be watertight.

Q. 92. *How is the double lock seam made?*

Ans. By turning two complete locks on the opposing ends of the metal and sliding the ends of the seams together. This seam is sometimes used to avoid soldering and to allow for expansion and contraction.

Q. 93. *How is the double seam made?*

Ans. This seam may be made either on the folder or burring machine as a single edge and then concluded over a suitable stake with a mallet. It is commonly used in fastening the bottoms on cans, buckets, tanks, etc.

Q. 94. *What is a concealed lock seam?*

Ans. This seam is soldered lightly on the outside. A box thus seamed is usually made to fit closely in a recess of other material. The concealed lock seam is sometimes used on corners and tops of boxes where a flash finish is desired.

Q. 95. *How is the dovetail joint used?*

Ans. This joint is often used on the side and bottom seams of heavy copper tanks and is made tight by brazing or silver soldering.

Q. 96. *What is the Pittsburgh Lock?*

Ans. The Pittsburgh lock somewhat resembles a large double seam. It is very strong and almost airtight. This joint is formed on the cornice brake before any other forming is done on the metal. It is used on large rectangular elbows and pipes or where it would be impractical or impossible to use a stake for double seaming.

Q. 97. *How is riveting done in sheet-metal work?*

Ans. Riveting may be done with a squeeze riveter, pneumatic riveting hammer, or by hand with a rivet set and hammer.

Q. 98. *What rivets are used for most flat riveting?*

Ans. Tinners' rivets. These rivets have a flat head with a comparatively short stem and may be obtained in black iron, tinned iron, copper, or brass.

(Continued on page 39A)

Switches

Shown above are a few of the many types of micro-switches, toggle switches, knife switches, rotary switches, band switches, etc., now available through the Hallicrafters Co., Chicago, agent for the Reconstruction Finance Corporation under contract SIA-3-24.

Other radio and electronic components such as resistors and condensers are also available in large quantities. Send the coupon for further details.

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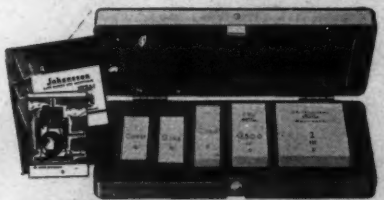

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Shop Equipment News

New Products—Publications

THE STORY OF CARBORUNDUM

An interesting 24-page book under the title "How Carborundum Serves Industry," has been recently published by The Carborundum Co., Niagara Falls, N. Y.

This book presents an interesting historical account of how carborundum was discovered, and how it was developed into one of the outstanding cutting tools of industry.

A copy of this interesting book may well be given a place on every school-shop reference shelf.

For brief reference use IAVE—1010.

HOW THE CARTER ROUTER IS USED

In an 8-page pamphlet entitled "Saving Money with Carter Machines," the R. L. Carter Division of The Stanley Works, New Britain, Conn., illustrates numerous applications of the Carter R.5A Router to actual work in sash and door mills, furniture factories, and woodworking plants. This material makes fine instructional or illustrative material for the bulletin board in the school shop in which cabinetmaking is taught.

For brief reference use IAVE—1011.

CONTINUOUS BAND FILING BULLETIN

The DoAll Continuous Band Filing Machine is described and pictured in a four-page, file size bulletin now being released by Continental Machines, Inc., 1301 Washington Avenue South, Minneapolis 4, Minn.

The bulletin shows how continuous band filing supersedes outmoded hand filing and reciprocal machine filing operations through proved tests indicating that continuous file broaching operations are many times faster than former methods.

Illustrations of the machine in operation show various internal as well as external file broaching jobs and the ease with which inexperienced operators can perform this work.

Included in the bulletin is a display of the various kinds of DoAll precision file bands available for any filing operation on the new DoAll Band Filer.

For brief reference use IAVE—1012.

FORMING LAMINATED PLASTICS

A new development believed to have important postwar applications in the use of laminated plastic material manufactured by the Formica Insulation Company, Cincinnati, Ohio, has been the product of wartime ingenuity and research.

Cut blanks of laminated Formica go into a forming press. When these pieces of sheet come out they are formed in ammunition chutes for bombers. The engineering department at Formica with the cooperation of some aviation engineers employed in the factories making the big bombers discovered that the cured sheet could be heated up to a temperature just under the blistering point, and if stamped quickly, could be formed to a shape, and that the formed shape could be maintained. The forming press operations are done quickly and simply. As a result of this wartime discovery and application, Formica will be useful for new applications in postwar days.

For brief reference use IAVE—1013.

FRICTION SAWING BOOKLET

The new technique for cutting materials known as "Friction Sawing," recently developed through the innovation of high speed sawing machines, is described in detail in a new 24-page booklet being released by the Machine Tool Division of the DoAll Company, manufacturers of the DoAll Zephyr high speed sawing machines.

The booklet explains why "Friction Sawing" is possible; its advantages and its limitations. Of particular interest is the "Job Selector" chart included in the booklet which contains a ready reference for selecting the proper sawing factors in cutting SAE steel, armor plate, stainless steel, illium, cast steel and cast iron.

The book contains valuable information which will be of interest to all persons seeking a faster way to cut and shape ferrous materials. Copies of the booklet are available upon request from the DoAll Co. (Machine Tool Division), 1301 Washington Avenue South, Minneapolis 4, Minn.

For brief reference use IAVE—1014.

AN IDEA FILE

The American Type Founders Sales Corp., 200 Elmora Ave., Elizabeth B, N. J., has just issued a 4-page folder entitled "ATF Printing Project Idea File for Educational Institutions." This folder presents a number of excellent examples of printing done in school print shops. It is worth some very careful study.

For brief reference use IAVE—1015.

A NEW TYPE OF JOINT

The Silbraz Joint — the modern threadless connection that actually bonds I.P.S. copper tubing and brass pipe into a single "one-piece" pipe line — is thoroughly described in Airco's new 16-page, 2-color booklet: "How to Cash in on the Silver Ring."

Profusely illustrated, the booklet shows how Silbraz Joints are made from patented bronze pipe fittings, valves and flanges — containing a factory inserted ring of silver brazing alloy in each port opening. The literature shows that when brass pipe or I.P.S. copper tubing is properly inserted in these fittings and the assembly is brazed, the resulting joint is not only leakproof, but stronger than the pipe itself.

Copies of the booklet, No. ADG-2017, are available on request from Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

For brief reference use IAVE—1016.

NEW ACETYLENE GENERATOR BULLETIN

Air Reduction, manufacturer of welding equipment and gases, has issued a new bulletin which features the new Airco Type *P* Portable Generator, incorporating an "air lift" water circulating system and enlarged radiation space between the carbide hopper and water level to provide cooler, double-scrubbed gas.

The bulletin describes and illustrates the company's complete line of generators, including portable models in 15-, 30-, and 50-lb. sizes with 30, 60, and 100 cubic feet maximum hourly productive capacity. Stationary models are available in 300- and 500-lb. sizes which deliver 300, 600, and 1000 cubic feet maximum hourly production.

Copies of the bulletin, which also list sizes and packaging of National Carbide for use in acetylene gas production, may be obtained from any Air Reduction office or by writing the company's general offices at 60 E. 42nd St., New York 17, N. Y.

For brief reference use IAVE—1017.

CATALOG OF GAUGES AND DIAL INDICATORS

The B. C. Ames Co., Waltham, Mass., has issued a new 40-page catalog describing and illustrating a wide line of gauges and dial indicators, indicator attachments, dial micrometers, upright gauges, cylinder gauges, caliper gauges, and jaw gauges. The firm also manufactures Rhodes shapers and slotters.

Complete information is available from the Ames Co., at Waltham, Mass.

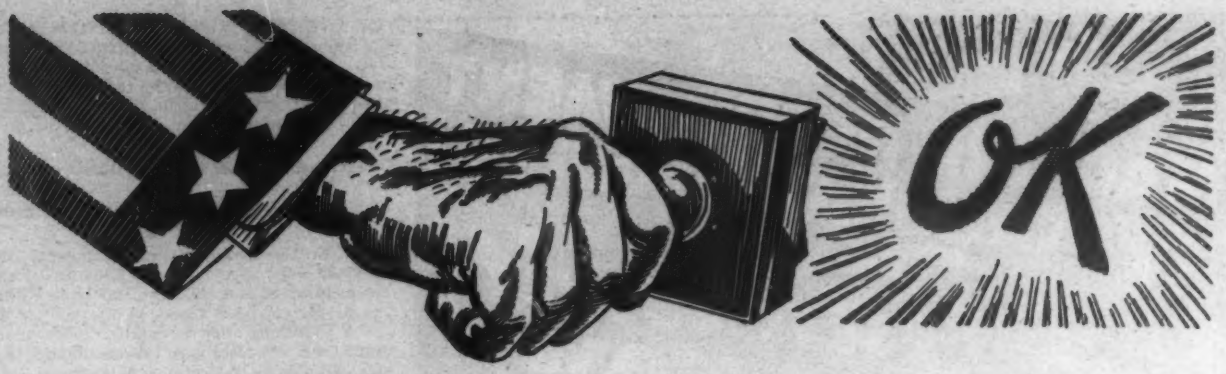
For brief reference use IAVE—1018.

SPECIAL TOOLS THAT HAVE BECOME STANDARD

Many carbide-tipped cutting tools generally classified as "special" are now listed as standard in the new Catalog No. 144 just issued by Wendt-Sonis Co., of Hannibal, Mo. These new tools are especially designed for carbide-tip construction, and have carbide inserts that are approximately 25 per cent longer.

The new standard carbide tools include: spiral reamers, jobber reamers, stub taper spot facers and counterbores, straight shank end mills,

(Continued on page 36A)



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(Continued from page 34A)

straight and taper shank spiral end mills, half-side straddle milling cutters in three types, side milling cutters, staggered tooth slotting cutters, router bits, inverted taper shank router bits, grinder half centers, boring tools, taper shank fly cutters, roller turning tools, and cutoff tools.

For brief reference use IAVE—1019.

TWO CINCINNATI PUBLICATIONS

Microscope Aligning Instrument is the title of an interesting booklet which has been made available. It describes how to check the alignment of long grinding machine beds.

Another booklet describes the Cincinnati Milling machine attachments that can now be obtained to increase the scope and operating efficiency of standard millers.

Both of these booklets can be obtained by writing to Cincinnati Milling and Grinding Machines, Inc., Cincinnati 9, Ohio.

For brief reference use IAVE—1020.

GAS AND ELECTRIC WELDING SUPPLIES PRICE LIST

The Air Reduction Sales Company, 60 East 42nd St., New York, N. Y., has announced the publication of a 20-page revised price list of "Gas and Electric Welding Supplies and Accessories."

In addition to prices, the contents include detailed information of assistance to buyers, including sizes, dimensions, weights, stock numbers, and recommended uses for products.

For brief reference use IAVE—1021.

INCREASE WALKER-TURNER PLANT

Walker-Turner Co., Inc., Plainfield, N. J., manufacturers of metal working and woodworking machine tools, broke ground on August 21 for an addition to Plant No. 2. The new construction for the two plants will be 200,000 square feet. These additions are being made to provide adequate production facilities to handle new business. It is expected that all new construction will be completed before the end of the present year.

For brief reference use IAVE—1022.

FLETCHER APPOINTED HEAD OF VOCATIONAL DEPARTMENT

D. C. Heath and Company, Boston, Mass., announces the appointment of Kenyon S. Fletcher as head of its newly formed vocational department. Mr. Fletcher comes to the field of textbook publishing after serving nearly five years as supervisor of operations for the Illinois Board for Vocational Education. A graduate of the Stout Institute and holding an M.A. degree from the University of Minnesota, Mr. Fletcher taught shopwork in the Charleston, W. Va., public schools three years and served as associate professor of industrial education at the Illinois State Normal University, Normal, for twelve years. In addition he taught at the Pennsylvania State College during the summers of 1940 and 1942.

Mr. Fletcher's experience includes editorial work on various bulletins for the Illinois State Normal University and *Teacher Education*. He was also editor of the *Journal of the Illinois Vocational Association*, *Illinois Vocational Progress*, and the *Illinois Vocational Association Yearbook*.

J. E. MARTIN APPOINTED VICE-PRESIDENT OF ATF SALES CORP.

American Type Founders Sales Corporation announces the appointment of J. E. Martin as vice-president in charge of operation, with direct responsibility for all matters relating to manufacturing and engineering.

J. E. Martin

Mr. Martin's background of experience with army ordnance and industry makes him well qualified to assume his new duties with ATF.

As Deputy Chief of the Artillery Division in the office of the Chief of Ordnance, Washington, D. C., his work in co-ordinating production of artillery manufacture by munitions producers won him the War Department's Meritorious Civilian Award.

Mr. Martin had formerly been general manager of the Link-Belt Ordnance Company, and, earlier, manager of the Stoker Division of Link-Belt Company, in charge of manufacturing, engineering, and sales.

CHESTER A. SNELL JOINS FOSTER D. SNELL, INC.

Chester A. Snell has joined the staff of Foster D. Snell, Inc., consulting chemists and engineers, 305 Washington St., Brooklyn 1, N. Y. Dr. Snell is an alumnus of Polytechnic Institute of Brooklyn where he received his B.S., M.S., and Ph.D. degrees in chemistry. He is a member of Sigma Xi, Phi Lambda Upsilon, A.A.A.S., A.C.S., A.I.C., and A.I.Ch.E. For the past three years Dr. Snell has been connected with the Chemical Development Division, Aluminum Company of America, East St. Louis, Ill.

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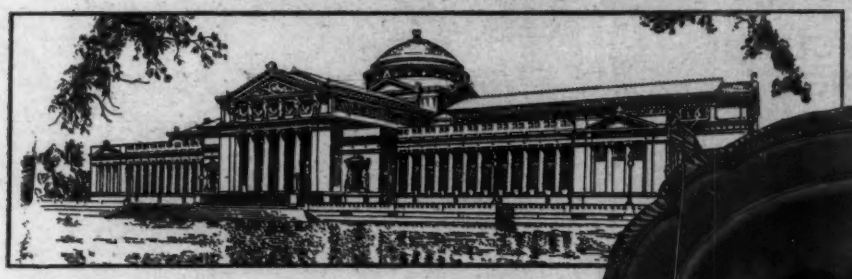

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14.	Plastics (enlarged 3rd edition)	4.00
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18.	How to Plan a House	4.50
19.	Building Trades Blueprint Reading Part 1	2.00
20.	Building Trades Blueprint Reading Part 2	2.00
21.	Machine Tool Guide	7.50

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PRECISE 35

(Continued from page 32A)

Q. 99. *How may the holes be made in the sheets to be riveted?*

Ans. The sheets to be riveted may be punched, drilled, or subpunched and reamed. In cold riveting, just enough hole clearance should be left to allow the rivet to slip through easily, while hot rivets require more clearance because of the difficulty encountered in handling them.

Q. 100. *How may buckling of the material be prevented, when a number of rivets are to be driven?*

Ans. The sheets should be held with clamps, bolts, or sheet-metal screws, temporarily spaced at equal intervals along the seam.

Q. 101. *How is the spacing of the rivets determined?*

Ans. By the nature of the work and the material used. In general, the minimum distance should be three diameters of the rivet stem with a maximum of eight diameters, while its minimum distance from the edge of the sheet should be two diameters. Rivets placed too close to the edge will cause the metal to stretch and tear, while too great a distance induces buckling and looseness.

Q. 102. *Upon what does the length of a rivet required to form a head sufficient for most work depend?*

Ans. It depends largely on the clearance between the rivet and the rivet hole, the material from which the rivets are made, and the material being riveted.

Q. 103. *In what order are rivets placed in lap joints?*

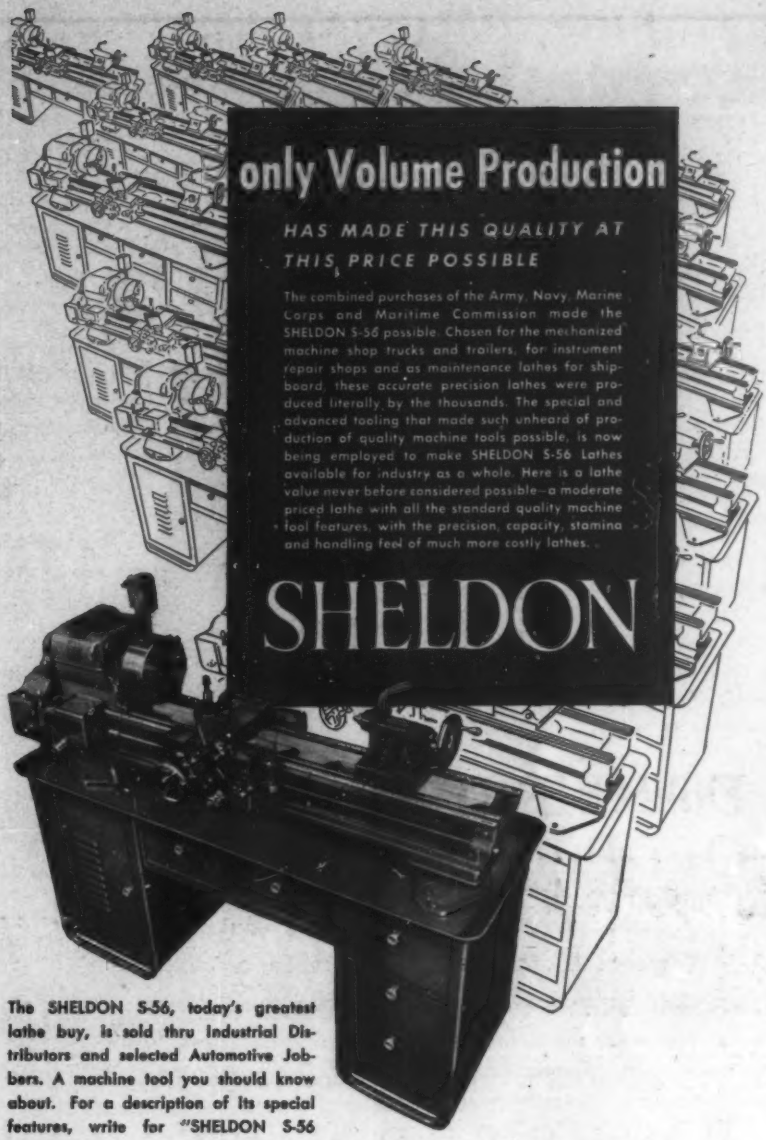
Ans. Riveting may be single row or double row staggered. Narrow seams are usually riveted with a single row of rivets in a straight line, while heavy sheets, having a lap of 1 inch or more, are usually riveted with a double row of staggered rivets, and this is especially true when the seam is to be sweated with solder.

Q. 104. *How is sheet metal usually formed?*

Ans. In cylindrical, square, or rectangular patterns, although many combinations of these basic shapes are also used. The pattern for the work is laid out on the metal, and allowances are made for laps or seams. The material is then cut out, and the seams made tight by grooving, soldering, or riveting.

Q. 105. *How are regular cylindrical shapes formed?*

Ans. These shapes, with either straight or flared sides, are formed on the forming rolls unless their finished diameter is less than that of the rolls. When wiring is required it is done before forming.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New Publications

Creative Crafts in Wood

By Michael C. Dank. Cloth, 200 pages, 7 by 10⅛ in., illustrated. Price, $3. The Manual Arts Press, Peoria, Ill.

A book that will interest the student in the school shop as well as the home craftsman who is working alone.

It covers coping saw work, wood stipple craft, and wood chipping craft.

The book is well illustrated and contains many very fine designs which can be copied or adapted to numerous articles for use in the making of toys, furniture, and articles of household use.

The Instructor, The Man, and The Job

By Charles R. Allen. Revised by George P. Hambrecht and R. L. Welch. Cloth, 399 pages, 5¼ by 7⅝ in. Published by J. B. Lippincott Co., Philadelphia, Pa.

A revision of the old book by Allen to bring it up to date, yet to keep intact the aims and the philosophy put into the book by Skipper Allen.

A chapter on plant instructor training has been added.

A Short Dictionary of Architecture

By Dora Ware and Betty Beatty. Cloth, 109 pages, 5¾ by 8⅛ in., illustrated. Price, $2.75. The Philosophical Library, New York City.

A book which contains a short outline of the history of architecture plus a glossary of architectural and building terms. It is copiously illustrated with fine line drawings.

Everyday Problems in Economics

By May Wood-Simons. Cloth, 544 pages, 5¾ by 8⅛ in., illustrated. Price, $3.50. American Technical Society, Chicago, Ill.

This book will undoubtedly find many friends among the increasing number of students who take up the study of economics.

It covers the history of economics; the part played by the consumer and producer; the function of money, banks, etc., in the exchange of commodities; the determination of costs; distribution of income; the farm and labor problem, trade associations, corporations, monopolies and economic planning.

The book also contains a glossary of terms and quite an extensive bibliography.

The Practice of Printing

By Ralph W. Polk. Cloth, 300 pages, 5⅜ by 8 in., illustrated. Price, $2.25. The Manual Arts Press, Peoria, Ill.

This is a revision of the author's well-known text on printing. It contains many references to helpful books and each chapter is accompanied by a set of questions for discussion.

There are 41 chapters in which the author presents the history of printing, type, spacing material, type setting, proofing and correcting, distribution, the point system, composition, proofreader's marks, locking up forms, the presses, make-ready and feeding, inks, composing machines, rules and borders, display printing, balance, proportion, harmony, paper, color, book composition, linoleum block printing, and offset lithography.

The book also contains a glossary.

(Continued on next page)

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(Continued from previous page)

Recent Occupational Trends in American Labor

By Dewey Anderson and Percy E. Davidson. Paper, 133 pages, 6 by 9 in. Price, $1.50. Cloth, $2.25. Published by Stanford University Press, Stanford University, Calif.

An analysis which supplements a previous study entitled Occupational Trends in the U. S., published in 1940.

It covers the professions and semiprofessions; agriculture; proprietors, managers, and officials; clerical and sales personnel; craftsmen and foremen; operators; service workers; and laborers.

The appendix presents three tables which show the number and percentage of workers, by sex, in the various occupational groups in the United States in 1940.

Code of Minimum Requirements for Instruction of Welding Operators

Prepared by Committee on Minimum Requirements of Instruction for Welding Operators in Trade Schools. Paper, 83 pages, 6 by 9 in. Price, 50 cents. American Welding Society, 33 West 39th St., New York City.

A revision of Part A has just come off the press. The predecessor of this small booklet, which has helped prepare many welding operators for war production, it covers the arc welding of steel 3/16 to ¾ in. thick.

The revision presents a modification in the manner of presentation, and there are some changes in the exercises and in the explanatory material. All of these changes help to make the material more inclusive.

Living Costs in World War II

By Philip Murray and R. J. Thomas. Paper, 237 pages, 6 by 9 in. Put out by Congress of Industrial Organizations, Washington, D. C.

A study which is based on a number of factors not considered by the Bureau of Labor Statistics. The contention of the authors is that living costs have risen 45.3 per cent for the wage earners, and not 22.8 per cent as commonly assumed from the Bureau of Labor Statistics reports.

Use of Training Aids in the Armed Services

Bulletin 1945, No. 9. Paper, 34 pages, 5⅞ by 9⅛ in. Price, 10 cents. Federal Security Agency, U. S. Office of Education, Washington, D. C.

This report outlines the scope, objectives, and pattern of military and naval training and shows how training aids and devices were used in preparing inductees in the armed forces.

The bulletin also shows how civilian educators can make use of some of the existing training aids.

Visualized Projects in Woodworking

By John I. Sowers. Cloth, 89 pages, 8⅜ by 11¼ in., illustrated. Price, 1.60. The McGraw-Hill Book Co., New York City.

A fine selection of woodworking projects ranging from those for the beginner to those suitable for the advanced worker. Each project is accompanied by an instruction sheet which shows what must be done, and how it must be done, to complete the task which has been set for the student.

Equipment Aids for Those With One Hand

By Louis J. Haas. Paper, 11 pages, 7 by 9¾ in., illustrated. Price, 80 cents. Published by Louis J. Haas, 3 Gedney Terrace, White Plains, N. Y.

The big job which confronts the occupational therapist is to convince the handicapped that his case is far from hopeless, that he can, even though handicapped, learn to do many things skillfully and efficiently.

After the patient has achieved that state of mind, specially prepared equipment will help him master needed skills, and practice will give him efficiency.

The author of this book has had much experience in preparing handicapped workers so that they could return to their jobs, and the equipment shown in this small treatise proves his ingenuity in getting around troublesome cases.

The making of equipment needed for bookbinding, drawing with pencil and ink, making metal fold-ups, wood-rasp carving, decorating, shorthand reading and typing in bed, are all illustrated and the construction is concisely explained.

Diesel-Electric Plants

By Edgar J. Kates. Cloth, 272 pages, 5¾ by 8½ in., illustrated. Price, $3.75. American Technical Society, Chicago, Ill.

This is the second edition of this comprehensive book on the electric equipment which is a necessary part of the Diesel engine. Since the characteristics of the Diesel engine influence the electrical equipment, the book starts out with a study of these characteristics.

These are taken up by a.c. and d.c. generators, voltage regulators, parallel operation, the Diesel engine governor, self-operation of Diesel plants, automatic controls and alarms, electric starting, installation and maintenance of generators and regulators, and finally a chapter on the Diesel-electric locomotives.

Conference Leader Training

By Edward S. Maclin and Paul T. McHenry. Cloth, 77 pages, 5½ by 8¼ in. Price, $2.50. National Foremen's Institute, Inc., Deep River, Conn.

A concise text showing how to conduct the conference, what the job of the conference leader is, the devices which he can use to do his work effectively, how he may be trained, how to start the series, how he may outline the work that is to be covered, and how the work of the leader may be evaluated.

The appendix suggests topics for conference discussion and presents a bibliography which may present much helpful reading matter for the beginning conference leader.

Practical Handbook for Counselors

Paper cover, 160 pages, 4½ by 9 in. Price, $1.50. Science Research Associates, Chicago, Ill.

This book has been prepared to assist counselors and teachers who are guiding our high school youth educationally and vocationally.

It was originally prepared by a committee of the New York State Counselors Association to assist the counselors in the high schools of New York, but will also be found helpful by counselors elsewhere who are confronted by the same type of problems.

The book defines the role of the counselor, and describes the meaning of guidance, the technique of counseling, records and their interpretation,

(Continued on page 42A)

New Stand Aids Instruction in Engine Overhauling

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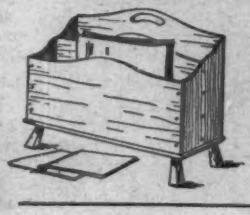

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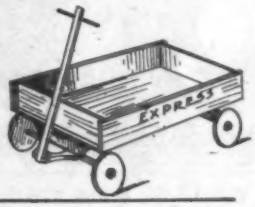

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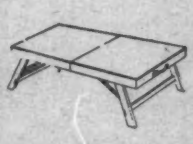

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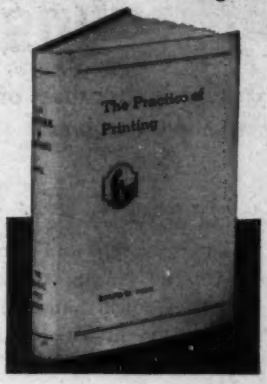

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(Continued from page 40A)

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The book also contains a useful bibliography of books on guidance.

Europe's Uprooted People — The Relocation of Displaced Population

Prepared and put out by the National Planning Association, 800 — 21st St., N.W., Washington 6, D. C. Paper, 50 pages, 5¼ by 7⅜ in. Price, 25 cents.

A National Planning Association Report on an investigation of Europe's displaced population, and the steps necessary to effect repatriation of these uprooted people without causing undue political, economic, health, and transportation problems.

Full Employment and the National Budget

Report No. 2-417. Citizens National Committee, Inc., 2633 16th St., N.W., Washington 9, D. C.

A 24-page research report on the Murray Full Employment Bill. It contains a summary of Bill S.380, and authorized statements by Senators Murray and Taft regarding the bill.

A War Job "Thought Impossible"

By Wesley W. Stout. Cloth, 51 pages, 5¼ by 8⅛ in., illustrated. Chrysler Corporation, Detroit, Mich.

An interesting booklet describing how an automobile manufacturer could quickly adapt quantity production methods to the manufacture of the sensitive and exquisitely accurate gyro compass.

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Cloth, 1282 pages, 6 by 8¼ in., illustrated. Price, $1.50. The Lincoln Electric Co., Cleveland 1, Ohio.

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Federal Security Agency, U. S. Office of Education, Washington, D. C.

Women at Work in Wartime

Public Affairs Pamphlet No. 77. Price, 10 cents. Public Affairs Committee, Inc., 30 Rockefeller Plaza, New York, N. Y.

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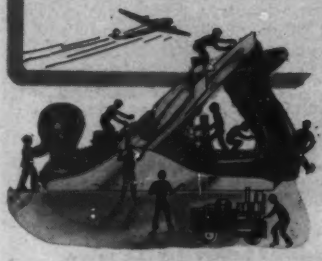

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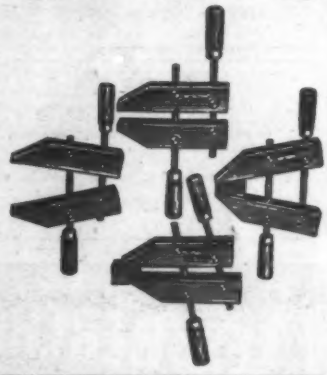

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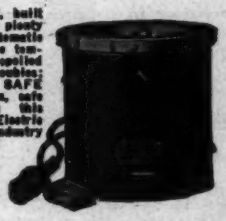

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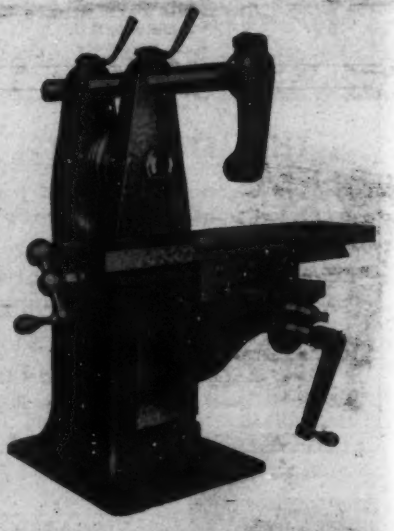

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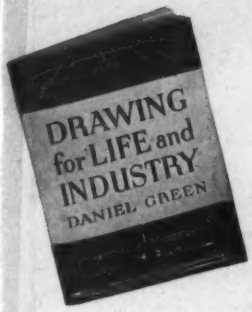

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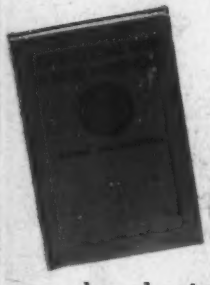

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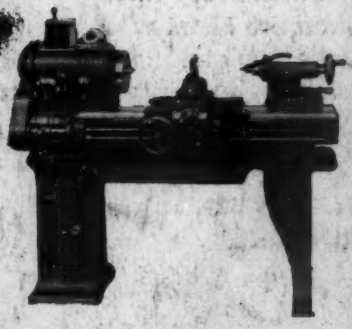

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